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BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 117



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# USSR REPORT

## BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 117

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## PROPHYLACTIC VACCINATION IN CHILDREN

Moscow MEDITSINSKAYA SESTRA in Russian No 6, 1979, pp 55-58

[Article by Candidate of Medical Sciences A. F. Sokolova, Scientific Research Institute of Pediatrics, USSR Academy of Medical Sciences, Moscow]

[Text] Prophylactic vaccinations play a decisive role in combatting many infectious diseases, especially in childhood. In correspondence with the scheme for immunization now existing in the Soviet Union, children in the first two years of life are vaccinated against 7 infections: tuberculosis, poliomyelitis, whooping cough, diphtheria, tetanus, measles and smallpox. Systematic and broad provision of prophylactic vaccinations have promoted a sharp decrease of morbidity of these infections. Morbidity of natural smallpox in the USSR was already liquidated in the USSR in 1936. The epidemiological wellbeing in the land can also be maintained in the future with systematic and correct immunization of the predominant majority of children.

It is known, however, that prophylactic vaccinations in some children can evoke inadequate reactions and even post-vaccinal complications. The latter are encountered quite rarely and, as a rule, through lack of observance of the rules of vaccination recommended by the instructions and directions for carrying out prophylactic vaccinations. Let us list infractions which are met quite often in immunization: 1) intervals are not observed between contracted diseases, mostly acute respiratory viral infections, and vaccinations; sometimes, vaccinations are made against a background of clinically mildly-expressed forms of acute respiratory infections (cough, rhinitis with normal temperature); 2) children are vaccinated even immediately after entering the children's establishment, periods of adaptation of the children to the new conditions are not adhered to and the epidemiological situation in the establishment is not taken into account; 3) parents are not notified about the forthcoming immunization of the children, sometimes they are not informed about a completed vaccination, as a result of which they do not carry out the proper maintenance for the vaccinated children, they do not observe the diet which is necessary in the period of vaccination for children with symptoms of exudative diathesis; 4) there

is a failure before the vaccination to carry out examination and treatment of children suffering from anemia, rickets, hypotrophies, exudative diathesis, etc.; 5) intensive and systematic observation of the vaccinated children is not carried out.

Prophylactic vaccinations are a more serious problem in children whose anamnesis contains various manifestations of allergy, symptoms of disturbance of the central nervous system, frequently, too, longtime illness, i.e., children with changed reactivity. These categories of children need an especially careful and individual approach. Hence, before vaccination the anamnesis on the one to be vaccinated should be carefully collected, the child should be carefully examined, his temperature should be taken. Examination of the blood and urine is carried out as necessary before vaccination. In some cases other examinations are made such as chest X-rays, recording of the EKG, EEG. Sometimes consultation of various specialists is required. And only when the child has been shown to be completely healthy, does he get prophylactic vaccination and systematic medical observation is set up for him. With the least disorder of the usual course of the vaccination process or with any sort of competing disease on the vaccination process, the child should be examined by a physician, where necessary he should be hospitalized in an isolation ward, especially with appearance of symptoms involving the central nervous system. Timely hospitalization permits initiation of therapy at an early stage and assures the best outcome of the disease.

First to be carried out (when the child reaches 5-7 days of age) is vaccination against tuberculosis. For this purpose, BCG vaccine is used at a dose of 0.05 mg per 0.1 ml of physiological solution. The vaccine is administered strictly intracutaneously at the boundary of the upper and middle third outer surface of the left arm. At the site of vaccine administration a white papule ("lemon peel") is formed, 5-6 mm in diameter, which is resorbed after 15-20 days and the skin takes on a normal appearance. No general reactions to the administration of this vaccine are seen in the child. Later, after 4-5 weeks, a specific vaccinal reaction develops--a 5-10 mm diameter infiltrate is formed, with subsequent pustulation, formation of scale and a round, indrawn scar. The total duration of development of the local reaction is 3-4 mos. With a good technique of execution of the vaccination and correct storage of the vaccine, a scar forms at the site of the inoculation in 90-95% of the children.

The basic indicator of acquired immunity and its strength is a positive tuberculin test (in 94-100% of the vaccinated children). A direct dependence is established between frequency of appearance and intensity of post-vaccinal allergy, first, and presence of a scar at the site of the inoculation and its size, second.

BCG vaccine has little reactogenicity. Complications usually have a local character and are noted comparatively rarely (0.003-0.02% of the cases).

Regarded as complications are subcutaneous, cold abscesses, ulcers 10 mm and more in diameter, lymphadenites of the regional lymph nodes (submuscular, cervical, supra- and subclavicular), calcinates of the submuscular lymphatic nodes, revealed by X-ray, keloid scars 10 mm in diameter and more in size at the site of the healing vaccination reaction. Basically, these complications are the consequence of a disturbance of technique of administering the vaccine (subcutaneously), of giving an increased dose of vaccine and vaccination of children with contraindications to vaccination.

Beginning with the age of 2 months, vaccination is performed against poliomyelitis. The vaccine consists of attenuated (weakened) strains of the virus of poliomyelitis of 3 serological types--I, II and III. It is issued in liquid form, red-orange in color, in vials and in the form of a sugar-lozenge, white in color with a mixture of the three types. To create firm immunity in the first year of life, the vaccine is used 3 times at an interval of 1½-2 months, in the second and third year of life--two times, at the age of 7-8 and 15-16 years--once.

Poliomyelitis vaccine, as a rule, causes neither general nor local reactions. Very rarely, unusual reactions and post-vaccinal complications are met. In children with unstable function of the gastrointestinal tract, short-term dyspeptic symptoms can be observed. In children with allergic reactivity, skin eruptions, dermatitis, Quincke's edema, etc., are possible. Seen very rarely after vaccination are mild paralytic diseases--vaccine associated poliomyelitis, the etiological association of which with the poliomyelitis vaccine is not always possible to prove.

Vaccination against whooping cough, diphtheria and tetanus is given from the age of 5 to 6 months, three times at an interval of 30-40 days, with the AKDS associated vaccine. The vaccine is administered intramuscularly in the upper outside quadrant of the buttocks or the anterior outside part of the thigh. Most children, who receive the AKDS vaccine, tolerate it with no general or local reactions. In some cases, in the first 2 days after vaccine administration, there arise general (in the form of a rise in temperature up to 37.5-38°C) and local (rapidly resorbed infiltrates) reactions.

However, after administration of AKDS vaccine, there may be seen, albeit rarely, extremely strong, general reactions, in the form of hyperthermia (temperature of the body 39-40°C) and appearance of intoxication (flaccidity, anxiety, disturbance of sleep and appetite), and, also, severe local reactions in the form of an infiltrate of the type of cold abscesses. In children with increased allergic reactivity, there can appear, in response to vaccine administration, rashes of a polymorphous character, (papular, urticarial, etc.), sometimes simultaneously with Quincke's edema. Seen in some of the children is an exacerbated exudative diathesis. The most dangerous allergic complication of the administration of this vaccine to older children is anaphylactic shock which arises either immediately after



vaccine administration or 5-6 hr later. Complication appears as a pronounced paleness, cyanosis, fall in arterial pressure, quick low pulse, restlessness, coolness of the extremities, sometimes abdominal pains, vomiting, labored breathing, convulsions, loss of consciousness. In one-year old children, there is seen a collapse-like state which develops in 5-6 hr and features the above-listed symptoms.

After administration of the AKDS vaccine, there sometimes arise an asthmatic syndrome, the syndrome of croup (here it is necessary to exclude an acute respiratory viral infection), a hemorrhagic syndrome.

Serious complications of immunization with this vaccine are complications involving the central nervous system, signs of which are a persistent, piercing cry, appearing right after vaccination and continuing for several hours, a convulsive syndrome associated with a high temperature or in its absence, and the occurrence of encephalitis. The latter is characterized by convulsions (more often repeated or uninterrupted), extended loss of consciousness, hyperthermia, vomiting, motor unrest, alternating sluggishness, drowsiness, hyperkinesia, pareses of the extremities, focal symptoms. The course of the disease is protracted, severe, not infrequently with an unfavorable outcome.

Of the other complications, also rarely encountered, we note kidney damage, intestinal disturbances.

Far more often one has to deal, not with the complications listed above, but with a superposition, on the vaccination process, of various competing diseases, rather often acute, respiratory, viral infections, which sometimes take a serious course, and, also, with exaggerations of one or another disease, (exudative diathesis, pyelonephritis, etc.), or provoked by action of the vaccine (seen, here, are various diseases involving the central nervous system, and a meningococcal meningitis, etc.). With the appearance of unusual reactions and complications, no further vaccination is carried out.

It is assumed that development of the described complications involve the whooping cough component of the vaccine. Starting with this and, also, considering the character of the complication and its severity, the vaccination can be continued with ADS-toxoid. If the child before this got one injection of the ADKS-vaccine, he is given ADS-toxoid once; if he got two injections, he is revaccinated with the ADS-toxoid after 1½-2 years.

At the age of one and older prophylactic vaccination is performed against measles with live measles vaccine prepared from a vaccinal strain, Lenin-grad-16 (L-16). The vaccine is given subcutaneously in the shoulder area or below the scapula.

In the majority of children the measles vaccination is not accompanied by any clinical symptoms. Sometimes, in a period of 6 to 18 days, the temperature is raised to 37.5-38.5°C and catarrhal symptoms are seen in the form



of a cough, insignificant conjunctivitis, rhinitis, occasionally a slight, pale-pink, measles-like, rash. The vaccine reaction stays no more than 2-3 days; in this period the child is not contagious for those around it.

Measles vaccine of recent years has low reactogenicity, few reactions and complications in those vaccinated are encountered very rarely. In children with allergic reactivity, both in the first days of vaccination and, also, at the climax of the vaccinal reaction there can appear allergic eruptions, Quincke's edema, an asthmatic syndrome or croup syndrome, a hemorrhagic syndrome of the hemorrhagic vasculitis type.

With strong general reactions to vaccination, the child's body temperature is raised to 39-40°C, symptoms of intoxication, a convulsive syndrome appear. The convulsions bear a tonic-clonic character, they are accompanied by loss of consciousness and other general brain disturbances. Prognosis is usually favorable, residual symptoms are extremely rare. In some cases the vaccinal process in measles injection can be complicated by pneumonia or lacunar angina. Mostly, in these cases, there is seen a superposition, on the vaccination, of an acute respiratory viral infection.

Prophylactic vaccination against smallpox is administered to children at the age of 1½-2 years, more rarely, 2 to 3 years. For this purpose, a smallpox vaccine is used which contains live smallpox virus. The basic method of smallpox vaccination in our country [USSR] is the method of linear incision. On the ether- or acetone-washed skin of the outer surface of the right shoulder, at the boundary of its upper and middle third, the vaccine is placed, with a glass rod or pipette on two places no less than 2 cm distant from each other. Then, single, linear incisions (scarifications) are made, 0.5 cm long each, and the vaccine is softly rubbed into them with a glass rod. Other methods of smallpox vaccination (method of multiple heating with a bifurcated needle and the method of intramuscular administration by a jet) are used by us, more rarely.

With a positive reaction to the smallpox vaccination, there appears, at the end of the 3rd or beginning of the 4th day, a specific reaction at the site of the vaccination: a red papule which then is converted into a blister with a transparent content--a vesicle (5-6th day of vaccination). On the 8-9th day the blister reaches its largest size, the liquid in it becomes cloudy-pustular, a pustule is formed, surrounded by a wide band of hyperemia (area). At the same time, regional (submuscular) lymphadenitis develops. In 50-60% of those vaccinated, the body temperature is raised (3 days), a general malaise is seen, the appetite is disturbed. After the 10th day, a stage of reverse development appears--the skin around the pustule grows pale, the infiltrate is resorbed, the pustules dry up. The formed scales drop off after 21-30 days, in their place remain reddish-colored scars which then become white.

The smallpox vaccination is very reactogenic, unusual reactions and post-vaccinal complications are met with it more often than after administration

of the other vaccines. In some children, there is seen an extreme reaction which is characterized by a large affected zone: erythema and infiltration of soft tissues are spread all over the shoulder, sometimes extending to the chest and spine. Sometimes, around the basic poxes there arise additional (daughter) poxes amounting in number from 1-2 to 10-12 (the result of lymphogenic spread of the virus of the vaccines).

A creeping vaccination usually begins with the appearance of additional poxes around the basic one, they run together, forming an area up to 2-3 cm in diameter. A vaccinal ulcer arises at the site of the pustule after the scabs drop off, mostly after its premature release or combination with a secondary, pustular infection.

Very rarely, usually in people suffering severe systemic diseases, who are getting hormonal and immunodepressive therapy, there is encountered a necrosis (gangrene) of the skin at the site of the vaccination. Union of a secondary, pus-like flora in the period of development of the local reaction causes development of an abscess (phlegmon), pustular lymphadenitis of a regional (submuscular) lymph node.

The most frequent complication of smallpox vaccination involving the skin is autoinoculation of the virus of the smallpox vaccine on the skin and mucous membranes. It arises as the result of mechanical transmission of the virus to this or that area of the skin and mucous membranes during scratching of the poxes by the hands, careless bathing, through dirtied laundry. Mostly, there is infection of the skin of the face, eyelids, and mucous membranes of the nose, sex organs of girls, the anus. The severest and most dangerous complication of this group is infection of the cornea and development of keratitis.

Vaccinal eczema is a very severe complication. This complication arises as the result of the vaccine getting onto the surface of pathologically changed skin (eczema, neurodermatitis, etc.). On the 6-8th day of vaccination there arises an aggravation of the skin disease in the form of a hyperemia, edema, a tissue-weeping. On the areas of affected skin, there appear numerous poxes which then run together, intermix and exude a pustular liquid. An extended, eroded surface is formed. The process is accompanied by high temperature, symptoms of intoxication, pronounced, exhausting itching. On recovery, a broad scar forms at the site of the vaccinal eczema.

In rare cases, with slow development of immunity, a generalized vaccination develops in those vaccinated. It is characterized by appearance, at various sectors of the skin and mucous membranes, pox elements of small size which heal, leaving no scars. Course of the complication is not serious. Not infrequently, various skin diseases are taken as a generalized vaccination. In children with allergic diathesis, allergic eruptions and Quincke's edema can be seen.

Especially dangerous are complications of smallpox vaccination which involve the central nervous system. An encephalitic reaction (encephalopathy, convulsive syndrome) is met primarily in children of the first 2 years of life, usually at the height of general and local reaction to the smallpox vaccinations, i.e., on the 6-9th day. This reaction is characterized by onset of convulsions with loss of consciousness. After discontinuation of the convulsions over 1-2 days, there is seen a flaccidity, drowsiness, disturbance of sleep and appetite. The course of the complication is favorable, mostly without residual symptoms.

A very serious and dangerous complication is post-vaccinal encephalitis (encephalomyelitis, meningoencephalitis, etc.). It develops more often after the first vaccination, in individual cases in the interval from the 4th to the 21st day. The disease can develop both acutely and also gradually. The first symptoms can be dullness, drowsiness, slowed reaction with simultaneous rise in temperature to high levels. Patients complain of headache, they vomit, focal neurological symptoms arise in them. Joined with these symptoms are convulsions, loss of consciousness. The course of the sickness is severe, death can ensue. On recovery, some of the children display residual symptoms in the form of disturbances of mental development, pareses, paralyzes. Causes of development of the post-vaccinal complications have not been fully discovered, to the present time.

All vaccines used in medical practise are known to be reactogenic to one degree or another. However, appearance of post-vaccinal complications in a small number of those vaccinated indicate that a large role in their development is played by changed reactivity, mostly allergic. In recent years, they also point to the importance of inadequate immunological reactivity.

To forecast features of the course of a vaccination process is frequently extremely difficult. For this reason, selection of children for vaccination, especially smallpox, should be careful and individual.

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THE BIOLOGICAL CHARACTERISTICS OF STAPHYLOCOCCI ISOLATED FROM THE ATMOSPHERE AND OBJECTS OF THE ENVIRONMENT

Ashkhabad ZDRAVOOKHRANYENIYE TURKMENISTANA in Russian No 1, 1979 pp 34-37

[Article by N. S. Orakayeva, A. N. Radzivonchik and V. A. Friauf, Department of Microbiology (Head -- Associate Professor Ye. G. Stepanyan) of the Turkmen State Medical Institute (Rector -- Professor N. N. Nurmamedov) and the Ashkhabad Oblast Sanitary Epidemiological Station (Head Physician -- Ye. N. Abukova)]

[Text] Staphylococci, which are permanent inhabitants of the mucosa of the nose, pharynx and integumenta of healthy and ill humans, also frequently found in the environment. The external environment, inoculated by staphylococci, especially in therapeutic institutions, may play a specific role in transmission of the infectious principle (V. S. Zuyeva and I. A. Shaginyan, 1972; A. K. Akatov and R. V. Izmaylova, 1975). The increased role of staphylococci in development of various diseases is explained by the wide distribution of antibiotic-resistant strains (L. K. Vepkhvadze, 1966; Z. M. Gasanova, 1966 and others).

S. D. Voropayeva and V. G. Kurdyukova (1967) emphasize the need to study the development of resistance in staphylococci to antibiotics, since antibiotic-resistant strains may be regarded as potential pathogens of intrahospital infections.

The object of our investigations were staphylococci isolated from the air and washings from different objects of the external environment of the Maternity Ward of the Ashkhabad Regional Hospital (152 strains). The following features of pathogenicity were determined in the investigated cultures: plasma-coagulating and lecithinase activity, the capability of mannitol of splitting under anaerobic conditions and hemolysis and sensitivity to staphylococcal phages. A total of 140 strains was subjected to typing by the international set of staphylococcal phages by the generally accepted method. The antibioticogram was studied with respect to penicillin, neomycin, tetracycline, monomycin, erythromycin and streptomycin. Moreover, the penicillinase activity of 96 cultures was determined by V. V. Lysin's method (1966).



A total of 145 of 152 coagulase-positive staphylococci split mannitol under anaerobic conditions. A total of 142 was lecithinase among the studied cultures. The hemolytic capability was recorded in 61.2 percent of the strains. A rather significant number of staphylococci (119 of 140) had phagolysis ability.

Table 1. Results of Antibiotic-Sensitivity of Plasma-Coagulating Staphylococci Isolated from the Air and Objects of the External Environment, Percent

(1) Препарат	(2) Степень чувствительности к антибиотикам				(3) Всего культур	
	(4) отсутствует	(5) слабая	(6) средняя	(7) высшая	(8) устойчивых	(9) чувствительных
Пенициллин (10)	58,0	28,0	8,0	6,0	86,0	14,0
Неомицин (11)	2,0	6,7	66,7	24,6	8,7	91,3
Тетрациклин (12)	11,3	37,3	44,7	6,7	48,6	51,4
Мономицин (13)	2,7	10,0	67,3	20,0	12,7	87,3
Эритромицин (14)	6,0	22,0	32,7	39,3	28,0	72,0
Стрептомицин (15)	19,3	28,7	52,0	—	48,0	52,0

Key:

- |   |                  |
|---|------------------|
| 1. Preparation                          | 8. Resistant     |
| 2. Degree of sensitivity to antibiotics | 9. Sensitive     |
| 3. Total of cultures                    | 10. Penicillin   |
| 4. Absent                               | 11. Neomycin     |
| 5. Weak                                 | 12. Tetracyclin  |
| 6. Medium                               | 13. Monomycin    |
| 7. High                                 | 14. Erythromycin |
|   | 15. Streptomycin |

The results of the antibiotic sensitivity of the studied staphylococci are presented in Table 1, from which it is obvious that most cultures are resistant to penicillin (86 percent). The sensitivity of staphylococci to such antibiotics as erythromycin, monomycin and neomycin is rather marked (within the range of 72-91.3 percent). The sensitivity of strains to tetracyclin and streptomycin is much less (51.4-52 percent).

Since the greater part of staphylococci are penicillin-resistant, it was interesting to determine the presence of the penicillinase enzyme in them. Staphylococci inactivate penicillin because of this enzyme and are penicillin-resistant. The penicillinase activity was determined in 53 cultures isolated from air and 48 strains isolated from objects of the external environment and in this case 44 and 36 cultures, respectively, were penicillinase-positive. The majority of the investigated staphylococci produced penicillinase (83.3 percent). Consequently, the penicillin-resistance of a large number of the studied cultures was determined by the presence of penicillinase.

Considering the results of phage typing of plasma-coagulating staphylococci isolated from the air and objects of the external environment, it was noted



that more than half of the strains (57.1 percent) were typed. Among them were 32 cultures isolated from the air of wards and the labor room, while the remaining cultures were isolated from washings of linen, the special clothing of medical personnel, the hands of doctors and so on. The phago-type pattern is diverse; phagotypes of phagogroup 1 and 3 are most frequently encountered: 80, 85 and 6. Type 187 comprised the majority of them.

Table 2. Biological Properties of Typed and Untyped Staphylococci Isolated from the Air and Objects of the External Environment

(1) Плазмокоагулирующие стафи- лококки	(2) Число изученных культур	(3) Признаки патогенности							
		(4) Лецитиназная активность		(5) Гемолитическая способность		(6) Маннитный тест		(7) Фагоуст- вительность	
		(8) опреде- лены	(9) обна- ружены	(8) опреде- лены	(9) обна- ружены	(6) опреде- лены	(7) обна- ружены	(7) опреде- лены	(8) обна- ружены
Типируемые (10)	80	80	78	37	21	80	77	80	77
Нетипируемые (11)	60	60	53	39	26	60	57	60	42

Key:

- |                                     |                      |
|-------------------------------------|----------------------|
| 1. Plasma-coagulating staphylococci | 7. Phage-sensitivity |
| 2. Number of studied cultures       | 8. Determined        |
| 3. Features of pathogenicity        | 9. Detected          |
| 4. Lecithinase activity             | 10. Typed            |
| 5. Hemolytic capability             | 11. Untyped          |
| 6. Mannitol test                    |                      |

We determined the following pattern in comparing the criteria of pathogenicity among typed and untyped staphylococci. There were more strains among the typed cultures which have lecithinase activity and which are lysed by a polyvalent staphylococcal phage. An almost identical number of typed and untyped staphylococci split mannitol under anaerobic conditions. The hemolytic capability was more marked in untyped strains (Table 2).

Conclusions

1. Staphylococci cultures isolated from the air and objects of the external environment have an adequate complex of features of pathogenicity and may essentially be qualified as "hospital strains."
2. The antibioticgram of the studied cultures is characterized by significant penicillin-resistance and high sensitivity to neomycin and monomycin.
3. The resistance of the majority of the investigated staphylococci to penicillin is determined by the presence of the penicillinase enzyme.

4. The phagotype pattern of staphylococci isolated from the air and objects of the external environment is diverse and is characterized by a prevalence of phagotypes of groups 1 and 3 (80, 85 and 6) in combination with type 187.

5. An external environment seeded with pathogenic staphylococci may contribute to spread of the infection. Questions must be raised about implementing the appropriate antiepidemic measures directed toward rendering the infectious principle harmless.

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CSO: 1840

THE SUICIDAL TENDENCIES OF PATIENTS SUFFERING FROM THE REMITTING FORM OF SCHIZOPHRENIA

Ashkhabad ZDRAVOOKHRANYENIYE TURKMENISTANA in Russian No 1, 1979, pp 41-46

[Article by A. Ovezov, A. Nokhurov and B. Akiniyazov, Republic Psychiatric Clinical Hospital No. 1 (Chief Physician -- B. G. Kryukova)]

[Text] There is no unified opinion in the literature on the syndrome of the clinical form or stage of the schizophrenic process which should be regarded as the most suicidally dangerous. We encountered indications on the suicidal activity of patients with respect to modern classification only in the work of L. A. Markis (1970), from whose data the suicidal tendencies of patients with paroxysm-like progredient schizophrenia are most frequently discovered (53.3 percent of the total number of patients who committed suicides).

The most promising from the viewpoint of working out the problems of preventing suicides in schizophrenic patients is study of the suicidal activity as a function of the form of the course of the illness, its dynamics and syndromes which have the highest degree of suicidal danger.

Analysis of the materials of posthumous judicial-psychiatric expert analyses on the fact of committing suicide, carried out in the Tadzhik SSR over 12 years, indicates that there are 56.9 percent of the cases of suicidal actions with fatal outcome for the remitting forms of the course of the illness among schizophrenic patients.

Qualification of the form of the course of schizophrenia was complex among those patients who committed a suicidal act during the first paroxysm, acutely developed on a background of visible health (22 of 29 with remitting schizophrenia). The short period of precursors, the high specific weight of affective disorders in the structure of the attacks, frequent inducement of the latter by exogenous factors, along with the main schizophrenic symptoms indicate the affiliation of the illness to the remitting forms (the enclosing or recurrent forms). Of course, the presence of the given symptoms does not guarantee a subsequent continuous course of the process, but similar clinical variants are less typical. Therefore, relating these

cases to remitting schizophrenia, we do not depart especially from clinical reality. Further differentiation of schizophrenia into enclosing and recurrent forms of these 22 patients was impossible due to the absence of the main criterion for evaluating the course of the process -- the quality of remission.

Seven patients of this group had already undergone several psychotic attacks by the time they committed suicide. Analysis of their structure and the quality of remission indicated the affiliation of the illness to the paroxysmal-progradient form of the course (enclosing). With regard to the fact that this analysis was impossible for most of the patients, we felt it feasible to consider all 29 patients in the total group of remitting schizophrenia without differentiating it into enclosing and recurrent forms.

Suicidal acts were undertaken by all the patients during the psychotic attack with the following syndrome variants: prevalence of hallucinatory disorders in 14 patients, prevalence of depressive disorders in 10 patients and affective-delirious disorders in 5 patients.

The attack with prevalence of hallucinatory disorders began with asthenia, a feeling of nonspecific somatic malaise and unaccountable uneasiness or melancholy. The patients' sleep became superficial and intermittent. Auditory and visual hallucinations, frequently dissimulated by the patients, occurred several days later. In some cases the visual hallucinations were distinguished by monotopicality and obsession, continuing for several hours or days, and in other cases they were of a brief, single episode (images of dead relatives, old men, witches and so on). Scenic hallucinations (extra-projected patterns of self-cremation of relatives, seeing bonfires and fires) occurred in two patients. Verbal hallucinosis of imperative content or extremely unpleasant to the patients occurred simultaneously with visual hallucinations and sometimes visibly and earlier. Voices ordered them or advised them to set themselves on fire, informed them about the death of relatives and so on.

In some cases the dynamics of the attack could not be followed. It was interpreted in the indications of witnesses that the patients were closed, committed incongruous acts, laughed for no reason and conversed with themselves for hours.

The suicidal act was undertaken frequently during the first hours or days after the onset of hallucinosis. Imperative hallucinations or a severe feeling of fear, melancholy, somatic illness related by the patients to the existing disruptions of perception, were the basis of the psychopathological motivation of the suicide where it could be clearly established.

The patients talked about the reasons for a suicidal attack during the short premortal hours after producing extensive burns and in this case references to severe situational circumstances were not recorded. Here are some of the typical explanations of the suicides: "Even over the radio they said -- 'Kill yourself, end your life with suicide'; 'I dreamed of a



stranger who said that he hates me and it would be better for me to end my life by self-burning'; 'Jean would not leave me alone and instructed me to set myself afire'; 'God wanted me to set myself afire'" and so on.

The suicidal acts were committed during the first or repeated attacks (in seven patients). The number of attacks, including those which ended in suicide, did not exceed three.

The given case illustrates the suicidal behavior during the period of the first attack which occurred with numerous scenic hallucinations.

Female patient O., 16 years old, report No. 66, dated 31 January 1970. She grew up and developed normally. She did not undergo any severe somatic illnesses. She began school on time, made good progress and participated in social life. There was a normal moral climate in the family. Her associates did not note any peculiarities in her behavior. She was in the 10th grade at the moment of her suicide. Two days before her death, she began to complain of melancholy, depression, noise in the ears, very superficial sleep and could not sit still. She did not go to school on 17 December 1969. She stayed at home and listened to the radio. Upon the request of her father to bring him some tea, she went into the kitchen and a little later ran into the hall covered with flames. Her father began to extinguish the fire on her, but she had already fallen. In answer to his question of why she had set herself afire, she answered: "Papa, I was surrounded by many little fires, they told me to set myself on fire, they then went into the barn and said if you set yourself on fire you will feel better and if you tell your parents they will also set fire to you. I then set myself on fire and they (the little fires) began to laugh. When the flame began to burn well, they said -- and now go tell your father. After this they disappeared and I did not see them any longer." The patient was brought in severe condition to the hospital with burns over the greater part of the body surface. In the hospital she complained of melancholy and noise in her ears. She said that when she was at home she saw that her girlfriends played with fire and her father was burning in fire. She heard voices calling her into the fire and after she had doused herself with solar oil and set herself on fire, the voices disappeared immediately. She subsequently told the same thing to the psychiatrist, having added that before setting fire to herself, she removed her dress and put on an old one. She said that no one had hurt her feelings and that her parents fulfilled all her requests. The patient died due to burns on 19 December 1969.

According to the conclusions of the posthumous forensic-psychiatric analysis, the patient suffered from depressive-hallucinatory syndrome while living.

The nosological qualification of the given psychotic state is complex. It is more realistic to suggest an acute attack of schizophrenia with catastrophically rapid development on a background of depression of verbal and visual hallucinosis. The latter is scenic in nature in the form of continuous pseudo-hallucination with phenomena of oneirism.



The patient undertook suicidal behavior due to the influence of imperative verbal hallucinations, but realization of it was facilitated by the presence of depression, which is an "indirect," although less demonstrative symptom.

The fact that some patients do not commit suicidal behavior during the period of the mental attack occurring with numerous hallucinations of unpleasant content while they undertook a suicidal act during subsequent attacks merits attention. This is possibly explained by the fact that during the attack resulting in suicide, the verbal hallucinations were distinguished by importunity, imperativeness and themes of the same type. These characteristics of hallucinations considerably exceeded their suicidal significance.

An attack with prevalence of depressive disorders in more than half the patients began after labor or psychogenia. Depressive states were psychopathologically inhomogeneous by the markedness of the melancholy affect and by the presence or absence of adynamia, disruptions of thought and disorders of perception.

Disorders of asthenic type (insomnia, vertigo, increased irritability and headache) predominated at the very beginning of the attack in some patients, while autistic reticence and shutting oneself off attracted attention in others. Finally, in some cases the depression itself was the very first clinical symptom of the beginning attack.

The inadequate completeness of the materials of the posthumous forensic-psychiatric expert analyses did not permit an exhaustive psychopathological analysis of the considered depressive states, but even the sparse data on the characteristics of behavior and the statements of the patients indicate atypical depression.

The typical triad of the depressive syndrome was not observed in most of these patients. The classical triad occurred only in one patient, but was combined with periods of mutism, refusal of food, hyponimia and expressionless face, so that the clinical pattern was more similar to a catatonic stupor rather than depression.

Delirious ideas of self-accusation, considered typical for the depressive syndrome, occurred in only one patient. Moreover, they occurred not as a result of intramental reprocessing of depressively tinted events of the past, but autochthonically, according to the type of primary delirium.

The depression proceeded in most of the patients without phenomena of psychomotor inhibition. On the other hand, fussiness, agitation, alarm and marked melancholy were noted. These states, before ending in a suicidal act, continued up to one year, interrupted by brief periods of laughter for no reason or impulsive behavior. Pseudo-hallucinations were suspected in some patients.

The given characteristics of depressive states permitted us to relate them to schizophrenia. We are not completely confident that the suicidal acts by all the patients of the given group were committed only due to depressive disorders, since in some cases we were talking more about a combination of depressions with verbal pseudo-hallucinations of an imperative nature.

Let us present an example of self-burning committed by a female schizophrenic patient during a psychotic attack, which occurred with prevalence of depressive disorders.

Patient B., 22 years old, No. 354, dated 20 November 1963. She was born in a family which did not have a history of mental illnesses. She contracted measles and influenza during childhood. She completed eight grades and soon after married. She was on good terms with her husband and was materially well off. She gave birth to a second child at age 21. Soon after giving birth, she began to complain to her mother that she was bored, melancholy, feeling alarmed, slept poorly and stopped looking after the children. Two months prior to her suicide, her husband found a letter of hers in which she wrote that she would end her life with self-burning and requested that no one be accused of this. She was admitted to a psychiatric hospital on 5 August 1963. Upon admission, she answered questions essentially, complained of melancholy for no reason and insomnia and said that she did not want to live. She was sociable with the personnel and patients, but complained of headache and irritability. She implored them to release her. She did not eat the hospital food and said that she is "squeamish." When they brought her infant to her for feeding, she was indifferent to it and fed it only at the request of her own mother. On subsequent days she burst out crying at the sight of the infant.

She explained the suicidal ideas written in the note differently. She first said that she did not know herself why she decided to end her life with self-burning. She then began to state that the idea of suicide occurred to her after a quarrel with her mother. However, she soon rejected this explanation and stated that she had not quarreled with anyone, including her mother. Her mother also rejected a quarrel.

No disorders of perception and delirium were noted in her during the stay in the hospital. No visible signs of depression were observed during the last few days. She conducted herself lucidly during conversations and assured her doctors that she was not thinking of suicide.

No deviations from the norm were observed on the part of her somatic and neurological state.

Since her husband insisted on release of the patient, a long conversation was held with her according to committee procedure on 12 August 1963 and the patient was released to her home on this day, accompanied by her husband. The diagnosis upon release was neurasthenic syndrome.

Nine days later, the patient was hospitalized in the regional somatic hospital with complaints of overall weakness, numbness in the extremities, insomnia, disposition to perspiration, tachycardia, absence of appetite and headache. No deviations from the norm were noted on the part of the internal organs. Treatment with drop doses of insulin, vitamins and glucose was carried out, but there was no improvement. The patient requested to be released, giving as a motive that she would feel better among her family. She was released from the hospital without a specific diagnosis on 31 August 1963.

The patient left a long premortal letter: "I attempted suicide myself. Do not touch anyone because of me. I am sane. I am committing suicide myself, therefore you have no right to trouble anyone because of this." She requested that her husband and mother "not be troubled." She repeated the same phrases several times in the letter: "An idea came to me in my heart and I did it; the good Lord himself came into my heart and after he comes in, no one can resist death." The letter abounded in reasoned arguments about life and death and contained many stylistically stereotyped phrases. She also wrote about the fact that she had lied to the doctors during her stay in the psychiatric hospital, saying that she had no bad ideas. The letter ends with the words "The end."

The expanded forensic-psychiatric committee, including representatives of the department of psychiatry, concluded that the patient suffered from schizophrenia during her life.

We presented cases of the "purest depression" encountered among the considered group of patients. However, the course of the depression was atypical in the given patient. Having begun with a seemingly vital feeling of melancholy and alarm, the depression soon becomes inexpressive, contains signs of ambivalence (the patient cries and says that she cannot live without her child, but becomes agitated; she is indifferent upon the appearance of the infant). During the next few days the suicidal intentions were easily dissimulated and no external manifestations of depressions could be observed, which also determined her release from the psychiatric hospital. Asthenic-vegetative disorders then come to the forefront and suicide follows soon after. The characteristic features of the patient's letters permit one to talk about her existing qualitative disorders during the thinking process (stereotypy). The noted characteristics of the course of depression and also dissociation between stable suicidal sets and nonmarkedness of external depressive manifestations indicate the schizophrenic genesis of the depressive syndrome.

The illegal release from the psychiatric hospital and the absence of appropriate treatment were the factors which, along with characteristics of the course of the illness, facilitated the realization of the stable suicidal tendencies of the patient.

Affective-delirious disorders when committing a suicidal act were observed in five patients with remitting schizophrenia. The characteristic feature

of the psychotic states is the incompleteness of delirious moods, the absence of a complex system of proofs and the specific nature of the delirious plot.

The appearance of delirious ideas in some patients was preceded by a brief period of melancholy, insomnia and asthenia. In other patients delirious ideas were a symptom of a beginning attack. The delirium of punishment, accusation, judgment and jealousy was most frequently observed. The patients related persons of their own close surroundings: relatives, coworkers, residents of the same village and so on, among the imaginary oppressors or ill-wishers.

Affective disorders, on the background of which the delirious ideas occurred, were expressed in a feeling of alarm, fear or melancholy.

It is obvious upon analysis of the acts of the patients, including suicidal acts, that they were universally determined by delirious sets of an autochthonically occurring feeling of fear, alarm and melancholy, but the patients' statements were sparse and reflect their experiences in the most generalized form ("they judge me," "they are coming to arrest me," "they are attacking us, we must flee," "they must kill me").

In half the cases the suicidal act was committed during the first psychotic attack and no later than one month after its beginning.

With the remitting forms of the course of the illness, the suicidal act was most frequently committed during the first psychotic attack due to imperative hallucinations, depression or affective-delirious disorders. The attack with a prevalence of imperative verbal hallucinosis frequently results in suicide during the first few hours or days after its occurrence and the depressive affect which accompanies the hallucinosis contributes to commission of the suicidal act.

Depressive states which determine the pattern of the attack and which is the reason for suicide occurred primarily with agitation, alarm, a vital feeling of melancholy and less frequently with rudimentary torpor and motor inhibition. Compared to acutely developed hallucinatory phenomena, the patients committed a suicidal act during the later periods after the beginning of the attack.

Suicidal acts undertaken during an affective-delirious attack were universally caused by delirious ideas (of a persecutor nature), an autochthonically resulting feeling of fear, alarm and melancholy. The delirious statements of the patients are sparse in this case and far from completely reflect the essence of their experiences. The presence of acute delirium very quickly results in suicide.

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# IMPEDANCE PROPERTIES OF METALLIC BIOELECTRODES

Moscow BYULLETen' EXPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 87  
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TUKSHAUTOV, R. KH. and GARIFULLIN, R. L., Department of Biophysics,  
Kazan Veterinary Institute imeni N. E. Bauman

[Abstract] Measurements were conducted on interelectrode impedance on human and animal skin using the 'two voltmeters' approach, employing 3 cm<sup>2</sup> metallic electrodes in the range of 0.1-100,000 Hz. The following series, in terms of decreasing impedance, was derived: Ta, Ti, Ni, Al, Fe, W, Pb, C, Zn, Cu, Au, Pt, Cd, and Hg. This was quite similar to heavy metal series forming albuminates of decreasing densities: Al, Pb, Fe, Cu, Zn, Ag, and Hg. While the difference in impedance between adjacent metals ranged from 5-25%, that between metals at the extremes of the series varied by several hundred percent at low frequencies. At frequencies greater than 10-50 kHz such differences became insignificant. Figures 2; references 12: 5 Russian, 7 Western.

USSR

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# UV IRRADIATION AND INTERACTIONS BETWEEN CELLS ACROSS AN OPTICAL SPACE

Moscow BYULLETen' EXPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol No 5,  
May 79 pp 468-471

KAZNACHEYEV, V. P., MIKHAYLOVA, L. P., RADAYEVA, I. F. and IVANOVA, M. P.,  
Biophysics Laboratory, Institute of Clinical and Experimental Medicine,  
Siberian Branch, USSR Academy of Medical Sciences, Novosibirsk

[Abstract] It has previously been reported that a biologically or chemically induced cytopathic effect (CPE) in one cell culture will be reflected in another culture separated from the first by a quartz partition, but not by a glass partition. The present studies undertaken with Hep-2 and human embryonic fibroblasts extend the phenomenon of 'mirror' CPE to UV induced damage, as well as to damage due to the growth of adenoviruses, 5, 23 or 71. In the latter case a prerequisite for the appearance of CPE in the 'mirror' culture is previous irradiation with a minimal (nonlethal) UV dose. The findings reported here suggest that weak UV emission by the 'directly' damaged cells leads to cellular injury in the 'mirror' cultures. Figures 3; references 12: 2 Western, 10 Russian.



## STUDIES ON HUMAN SKULL BONES WITH REFLECTED ULTRASONIC WAVES

Riga MEKHANIKA KOMPOZITNYKH MATERIALOV in Russian No 3, 1979 pp 508-514  
manuscript received 27 Dec 78

DZENIS, V. V. and PURIN'SH, YU. I., Riga Polytechnical Institute, and  
Riga Medical Institute

[Abstract] An approach is presented for ultrasonic studies on the human skull dressed in a rubber cap with small holes 20 mm from each other, located along defined meridians, employing 50 kHz waves for measurements. The data were evaluated on the basis of the range of ultrasonic wave velocities which ranged from 0.76 to 2.47 km/sec, depending on the location on the skull being measured and individual variability. The results showed that this method can be used to accurately detect suture line since velocities decrease by 20-40% at such points, as well as to localize pathologic changes in skull and brain lesions (including neoplasms). Figures 6; references 5, Russian.

## USSR

## INVESTIGATION OF THE EFFECT OF UV LIGHT ON BIOLOGICAL MEMBRANES. IX: ROLE OF VARIOUS STAGES OF PEROXIDE PHOTO-OXIDATION OF LIPIDS IN INCREASING THE IONIC PERMEABILITY OF THE MITOCHONDRIA

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28 Dec 78

PETRENKO, YU. M., ROSHCHUPKIN, D. I. and VLADIMIROV, YU. A., 2nd Moscow  
Medical Institute imeni N. I. Pirogov, Moscow

[Abstract] It is shown that treatment of specimens with oxidized lipids of ferrous oxide in a considerable concentration results in an increase in the level of TBA-active products., if there is no peroxide oxidation of the original lipid molecules. Then TBA-active products form from hydroperoxides, since prior incubation of oxidized lipids with potassium iodide eliminates this effect. On the basis of the obtained data method for determining the relative content of lipid hydroperoxides in biomembranes is proposed; the method consists in recording the increase in the concentration of TBA-active products due to the action of ions of bivalent iron. The proposed method was used to investigate the role which the stages of the formation of hydroperoxides and secondary products of peroxide photo-oxidation of lipids play in the increase in the ionic permeability of the inner membrane of the mitochondria of rat liver at UV-irradiation.

Following irradiation by means of a SVD-120 A lamp passed through a BS-4 color filter (transmission at wavelengths  $\lambda > 280$  nm), the membranes of the mitochondria are characterized by a ratio between the concentration of hydroperoxides and that of TBA-active products which is several times as high as in the case of irradiation via a Boeckstroem color filter (250-350 nm). For both these modes of irradiation in doses assuring in both cases an identical extent of peroxide photo-oxidation of the lipids, the increase in the potassium permeability of mitochondrial membranes--as monitored according to the energy-dependent swelling organelles in a medium containing potassium acetate--and the dissociation of oxidizing phosphorylation prove to be much more marked for irradiation in the 25-350 nm region. All this means that the disruption in the barrier properties of the mitochondria under the action of the peroxide photo-oxidation of lipids reaches its maximum during the stage of the formation of secondary products, and that the formation of hydroperoxides in itself does not markedly affect these properties. Complete text of article deposited at the VINITI [All-Union Institute of Scientific and Technical Information] on 20 Feb 79 (Dep. No. 651-79).

USSR

#### DEGREE OF CYTOGENETIC DISORDERS AS A FUNCTION OF THE ENERGY AND POWER OF LASER RADIATION

Moscow BIOFIZIKA in Russian Vol 24 No 3, May/Jun 79 p 566 manuscript received 4 May 76

KHOKHLOV, I. V., MOSTOVNIKOV, V. A., RUBINOV, A. I. and SHAMGINA, L. K., Institute of Physics, BelSSR Academy of Sciences, Minsk

[Abstract] Human embryo cells in a monolayer culture were used to investigate the extent of chromosome rearrangements and the variation in mitotic activity and in ratio between mitotic phases as a function of the energy (ranging from  $10^{-2}$  to  $10^2$  joules/cm<sup>2</sup>) and power of the radiation of a ruby laser (within the range of  $10^5$ - $10^9$  wt/cm<sup>2</sup>). Radiation doses causing stimulation of cell division accompanied by changes in the surface-adhesive properties of the cells were established. The role of nonlinear optical processes as a primary mechanism of the formation of cytogenetic changes is discussed. The complete text of the article was deposited at the VINITI [All-Union Institute of Scientific and Technical Information] on 20 Feb 79 (Dep. No. 652-79).

USSR

# PROLONGED AFTERGLOW OF MICROORGANISMS

Moscow BIOFIZIKA in Russian Vol 24 No 3, May/Jun 79 pp 544-545 manuscript received 1 Jul 77

PETUKHOV, V. G. and OSIN, N. S., State Scientific Research Institute of Standardization and Inspection of Medical Biological Preparations imeni L. A. Tarasevich, Moscow

[Abstract] Bacteria and yeast organisms are known to display prolonged luminescence in the red portion of the spectrum, and in this connection, the afterglow of the yeast organisms *Saccharomiceas cerevisiae*, aerobic bacteria *E. Coli* and *St. aureus*, and anerobic bacteria *Cl. pasterianum* and *Cl. sphenoides* was recorded in the short-wave part of the spectrum with the aid of a setup serving to record phosphorescence with the lifespan  $\tau > 10^{-3}$  sec. The afterglow could be recorded only in anerobic conditions and was extinguished by oxygen. The spectrum of the afterglow depends on the wavelength of exciting light, which points to the presence of the afterglow of several different substances. The excitation spectrum of the afterglow lies in the ultraviolet region and encompasses the blue region of the spectrum. Apparently, this type of luminescence is due to the presence of the protein coenzymes of NAD and flavin (the presence of a protein matrix is a prerequisite, since neither NAD nor riboflavin in itself displays prolonged luminescence in water). The afterglow of NAD is represented by a phosphorescence with a peak at 515 nm, while the afterglow of riboflavin displays peaks at 534 and 620 nm, the first peak being represented by delayed fluorescence and the second (620 nm) by phosphorescence. In dry lyophilized cells, afterglow sharply increases (by a factor of more than 30-50 times): this is apparently due to the complete removal of free water which is accompanied by the conversion of flavins and NAD to adsorbed state with "rigid" molecular surroundings, but it also may be due to the formation of complexes of coenzymes with the ions of metals during lyophilic drying. Figures 2; references 5: 2 Russian, 3 Western.

USSR

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# CEREBRON: ITS THERMOTROPIC AND LYOTROPIC MESOMORPHISM

Moscow BIOFIZIKA in Russian Vol 24 No 3, May/Jun 79 pp 454-459 manuscript received 5 May 77

SELEZNEV, S. A. and CHISTYAKOV, I. G., Ivanovo State Medical Institute and Institute of Crystallography, USSR Academy of Sciences, Moscow

[Abstract] Considering that research into the structure of lipid systems of various types is important because they can be used as convenient models of cell membrane structures, this paper presents the findings of a study of cerebrin, a glycolipid of animal origin, obtained from the cerebroside

fraction extracted from the brain of persons dead from accidental causes. On the basis of x-ray structural, electronmicroscopic and differential-thermal analyses of specimens, it is concluded that, the investigated temperature-concentration range for cerebron (1-100%, 20-96°C) was represented exclusively by a phase of the lamellar type of symmetry. This is due to the geometry of the cerebron molecule, which is cylinder-shaped, unlike, e. g., the cone-shaped structure of the lysolipids. This is associated with the fact that cerebroside in mammals are chiefly present in the membrane structures of the central nervous system. These myelin-rich formations are probably represented by extensive two-layer regions. Its ability to retain a stable bilayer despite marked ambient-temperature variations accounts for the stability of myelin as contrasted with the structural lability of other membrane systems. Since the transition point in hydrated cerebron is fairly high, it can be assumed that in biological membranes cerebron is clustered in discrete regions. Such regions (domains) may be represented by islets of the  $L_\beta$  phase submerged in the "sea" of the  $L_\alpha$  phase of lipids. Owing to hysteresis effects, transitions in these domains may serve as the material foundation of processes of short-term memory in morphological formations of the central nervous system. Prototypes of such mechanisms are used in technology when designing memory cells. Such a theory may, despite the lack of adequate experimental proof as yet, exemplify the possible existence of correlations between the structure and properties of mesomorphic lipid systems and biostructures. Further research will probably reveal as yet unknown structural-functional connections in biological systems whose "elementary cell" is represented by a bimolecular lipid layer. Figures 3; references 12: Russian 3, Western 9.

USSR

#### FREE RADICALS FORMING DURING THE UV-IRRADIATION OF OXIDIZED PHOSPHATIDYL CHOLINE

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ISLOMOV, A. I., AZIZOVA, O. A., ODINOKOVA, G. G., ROSHCHUPKIN, D. I., REMIZOV, A. I. and VLADIMIROV, YU. A., 2nd Moscow State Medical Institute imeni N. I. Pirogov

[Abstract] Pre-oxidized specimens of chick-eggs phosphatidyl choline (lecithin) were used to investigate, by the EPR method, the nature of the free radicals forming from the various products of the oxidation of chains of unsaturated fatty acids under UV-irradiation. Since it is known that UV-irradiation causes the peroxides of linoleic acid to decompose into free radicals which initiate the oxidation chains of the original molecules,



it was assumed that other products of oxidation can analogously participate in the process of the peroxide photo-dissociation of fatty-acid chains. The investigation, based on measurement of the EPR spectra of UV-irradiated phosphatidyl choline at 77 K, showed that UV irradiation at  $\lambda > 260$  nm results in the formation of radicals chiefly owing to photochemical reactions in the compounds containing aldehyde and polyene groups. Irradiation at  $\lambda < 260$  nm resulted in the formation of radicals owing to the disruption of hydroperoxides as well as of  $-\text{OC} = \text{O}-$  and  $-\text{CH}_2-\text{N}^+(\text{CH}_3)_3$  groups, that is the dissociation of conjugate hydroperoxides and of characteristic phospholipid groups. Figures 3; references 17: 10 Russian, 7 Western.

USSR

#### FREE RADICALS FORMING DURING THE UV-IRRADIATION OF LIPIDS OF BIOLOGICAL MEMBRANES

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AZIZOVA, O. A., ISLOMOV, A. I., ROSHCHUPKIN, D. I., PREDVODITELEV, D. A., REMIZOV, A. N. and VLADIMIROV, YU. A., 2nd Moscow State Medical Institute imeni N. I. Pirogov and Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] Damage to membranes is a major factor in the UV-irradiation of the cell. This is largely associated with the photochemical reactions of proteins and lipids. But while it is known that the photolysis of membrane lipids is chiefly due to the photo-oxidation of the fatty acids of phospholipids, the primary stages of the action of UV-irradiation have previously been relatively uninvestigated, except that it has been discovered that they are attended by the formation of free radicals. In this connection, the primary free radicals and their reactions in UV-irradiated chick-egg and synthetic phosphatidyl cholines and their analogues, as well as in model compounds, were investigated by the EPR method. UV-irradiation saturated fatty acids was observed to result in the build-up of  $-\text{CH}_2\dot{\text{C}}\text{H}_2$  radicals due to the disruption of the  $-\text{CH}_2\text{CH}_2-\text{COOH}$  bond. In amino alcohols there form the radicals  $\dot{\text{C}}\text{H}_3$ ,  $-\text{O}\dot{\text{C}}\text{H}_2$ ,  $\text{H}\dot{\text{C}}\text{O}$  due to the disruption of the  $-\text{OCH}_2-\text{CH}_2\text{N}^+(\text{CH}_3)_3$  and  $-\text{CH}_2-\text{N}^+(\text{CH}_3)_3$  bonds. It was found that in natural and synthetic phospholipids, radicals form in the course of photochemical reactions in complex-ether and amino groups. Formulas accounting for the formation of these radicals are presented. Figures 5; references 17: 11 Russian, 6 Western.

## PROGNOSIS OF AUTOPURIFICATION OF SOIL CONTAMINATED BY NUCLIDES OF THE URANIUM-RADIUM SERIES

Moscow GIGIYENA I SANITARIYA in Russian No 1, 1979 pp 36-38 manuscript received 5 Jun 78

MORDBERG, YE. L., SHEVCHENKO, I. I. and ARKHIPOV, A. F.

[Abstract] An experimental plot of soil (slightly argillaceous chernozem with a humus layer about 50 cm deep) was experimentally contaminated with a weak sulfuric acid extract of uranium ore. Subsequently samples of the soil were collected 4 times during the next 3 years by means of a soil drill and separated by layers (top 0-5 cm layer, tillable 5-25 cm layer, and subsoil 25-50 cm layer) and tested for the presence of radium-226, thorium-230, and lead-210. No definite pattern of variation in absolute values of nuclide concentrations could be established, and hence the findings were subjected to correlation analysis in order to establish a model describing the distribution of relative nuclide concentration over the soil cross section. A general trend toward the downward movement of the relative concentration maximum in time was thus established; the longer the time, the deeper that maximum sinks into the soil. This trend was most distinct for uranium, and less so for thorium and lead-210, while for radium the position of the relative concentration maximum remained virtually unchanged. These differences may be due to the considerable amount of sulfate ions present in the soil, which apparently slow down the migration rate of such elements as radium and lead, owing to the formation of relatively insoluble sulfates. By contrast, uranium and thorium, which tend to form complexes with sulfate ions, retain a higher mobility. These findings serve to predict the autopurification of soil due to the vertical migration of nuclides. If the soil is left untilled, the downward migration of the contamination peak can be expected with in 10-20 years for uranium, within 25-30 years for thorium, and after more than 20 years for lead, i.e. over a period commensurate with its half-life. Radium-226 migrates downward to the subsoil layer most slowly. While these findings pertain to a particular soil type, climate, and type of contamination, the procedure can be applied in other similar cases. References 11; Russian.

CHANGES IN THE SPONTANEOUS DIURNAL RHYTHM OF VARIATIONS IN ERYTHROCYTE COUNT OF THE BLOOD OF WHITE RATS AS A CRITERION OF THE TOXICITY OF XENOBIOTICS

Moscow GIGIYENA I SANITARIYA in Russian No 1, 1979 pp 58-62 manuscript received 3 Apr 78

KORDYSH, E. A. and RATPAN, M. M., candidates of medical sciences and YEREMEYEVA, L. S., candidates of biological sciences, L'vov Scientific Research Institute of Epidemiology and Microbiology

[Abstract] The diurnal dynamics of the erythrocyte count of the blood of white rats upon administration of an environmental pollutant--the anionic surface active substance (SAS) sulfirol-8--was investigated. Aqueous solutions of sulfirol-8 were intragastrically administered to the rats daily for 6 months. Allowing for the cumulative properties of the chemical, the test doses amounted to 30, 6, and 1.2 mg/kg (1/200, 1/1000 and 1/5000 of LD<sub>50</sub>). The diurnal variation in erythrocyte count was determined with the aid of an erythrohemometer in regularly collected blood samples. It was established that the spontaneous diurnal variations in the erythrocyte count of the blood of control rats follow a physiologically constant circadian rhythm with a peak in the early morning and a nadir at noon (during the summer-fall period). In rats administered sulfirol-8, this rhythm was disturbed, with the peak erythrocyte count appearing 2 hr earlier, at 5 instead of at 7 a.m., which is to be interpreted as a compensatory enhancement of function in response to the action of the poison. These findings demonstrate the suitability of circadian rhythm as a criterion for the toxicity of xenobiotics, and justify including biochronometry in the arsenal of sanitary-toxicological tests. Figures 2; references 7: 4 Russian, 3 Western.

CERTAIN ASPECTS OF THE SANITARY PROTECTION OF WATER BODIES IN THE POLAR REGION

Moscow GIGIYENA I SANITARIYA in Russian No 1, 1979 pp 81-82 manuscript received 12 Jul 78

KHRISTENKO, P. P. and SIROTKINA, D. D., Noril'sk Sanitary Epidemiological Station

[Abstract] The rapid growth of industry in the Far North of the USSR is creating the danger of environmental pollution. This is due, particularly, to an increase in discharges of industrial liquid wastes into water bodies.

The situation is aggravated by the severe local climatic conditions resulting in lower temperatures, by a lower content of nutrients in the water bodies and by a marked decrease in the metabolism of microorganisms and the attendant decrease in oxygen intake. These factors also slow down the process of autopurification so that the degree of contamination of the water bodies by metals in particular remains high. The industrial liquid wastes can be treated by means of neutralization and clarification, while residential liquid wastes can be treated in the same manner as in other climatic regions, except that the water treatment facilities must be housed in some structure to prevent freezing. In general the construction of water treatment facilities in the Polar region should be made mandatory because the presence of heavy metal salts and low temperatures impedes the process of autopurification. A three-year study demonstrates the fundamental feasibility and high effectiveness of the water treatment plants in the conditions of the Polar region. Figures 1; references 5; 3 Russian, 2 Western.



## MYCELIAL FUNGI THAT PRODUCE PROTEIN FROM CELLULOSE

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 13 No 2, 1979 pp 118-122  
manuscript received 22 Feb 78

BABITSKAYA, V. G., STAKHEYEV, I. V. and PLAVSKAYA, A. I., Institute of Microbiology, BSSR Academy of Sciences, Minsk

[Abstract] Cellulose and many other polysaccharides are major components of agricultural and industrial wastes. Microbiological transformation of the cellulose resulting in protein production may aid in solving existing protein deficiency and also increase the nutritive value and digestibility of the wastes. Biomass yield and protein synthesis from straw was studied in museum and soil microscopic fungi (Trichoderma lignorum, T. koningii, Penicilium terlikowskii, P. verruculosum, P. notatum, Aspergillus awamori and Penicillium spp. 1, 2, 205, 206, 228 and 304). The highest biomass yield (10 g/liter) was obtained with the use of ground and steam-treated straw, but the final product contained unused substrate. Crude protein produced was 27% for the museum strains and 35% for soil strains. The use of partially delignified straw was optimal with a biomass yield of 5-10 g/liter and crude protein yield of 32-40%. T. lignorum, T. koningii, P. notatum, P. verruculosum and A. awamori, etc., were the optimal producers. Optimal growth conditions, growth dynamics and accumulation of biologically active substances on a partially delignified straw medium were studied in T. lignorum. C<sub>x</sub>-cellulase synthesis began at 12-24 h; the straw was completely hydrolyzed after 60-96 h. Biomass accumulation and protein synthesis are concurrent in T. lignorum with maximum growth observed at 12 h. The total biomass reaches a maximum at 63-96 h and C<sub>x</sub>-cellulase activity at 96 h. Analysis of protein concentration, biomass, the proportionality coefficient and true biomass at the end of cultivation indicated that the biomass yield was 6.5 g/liter with 21.9% true protein; 100 g of biomass contained 21.9 g of protein and 1 liter of culture medium 1.4 g of protein. Under laboratory conditions, 1 kg of NaOH-treated straw produced 200-240 g of protein (30-40%) with 21-25% true protein. Figures 2; references 7: 1 Russian, 6 Western.

## MICROBIOLOGICAL HYDROLYSIS OF 3-ACETOXY-1, 4-BENZDIAZEPIN-2-ONES.

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 13 No 4, Apr 79  
pp 80-82 manuscript received 4 Nov 78

DAVIDENKO, T. I. and KUZNETSOVA, YE. V., Physico-Chemical Institute, UkrSSR  
Academy of Sciences, Odessa

[Abstract] Normally, 3-oxyderivatives of 1,4-benzdiazepin-2-ones are difficult to synthesize. In this connection, it was of interest to investigate the possibility of synthesizing these drugs (used in the treatment of neuroses, certain forms of depression, alcoholic psychosis, and febrile states) by the microbiological method, particularly as regards the stage of the hydrolysis of 3-acetoxy-1,4-benzdiazepin-2-ons. The experiments were conducted by using the mycelial fungus strains *Asp. niger* 78, 135, 159, *Asp. oryzae* 82, and *Asp. nidulans* 282B from the collections of two research institutes (All-Union Scientific Research Institute of Antibiotics and Institute of Microbiology and Virology UkrSSR), as well as several different types of nutrient media. Spectrophotometric monitoring of the formation of 3-hydroxyderivatives of 1,4-benzdiazepin-2-ons revealed that the maximum yield of final product was achieved upon microbiological hydrolysis with *Asp. nidulans* 282B and *Asp. oryzae* 82 in a medium consisting of: corn extract, 1%; saccharose, 2%; NaCl, 0.5%,  $(\text{NH}_4)_2\text{SO}_4$ , 0.4%;  $\text{CaCO}_3$ , 0.5%; starch, 2%, and with pH of 7.0, for 3 days. The yield of these 3-hydroxyderivatives by microbiological hydrolysis is satisfactory (25-48%) and can compete with the chemical method of producing these 3-hydroxyderivatives. References 3: 1 Russian, 2 Western.

USSR

UDC: 613.6:[632.95:631.544

## HYGIENIC ASPECTS OF THE APPLICATION OF PESTICIDES TO SHELTERED SOIL

Moscow GIGIYENA I SANITARIYA in Russian No 1, 1979 pp 74-76 manuscript received 23 Jan 78

BELONozHKO, G. A. and ZOR'YEVA, T. D., Kiev, All-Union Scientific Research Institute of the Hygiene and Toxicology of Pesticides and Polymers and Other Plastics

[Abstract] In connection with the spread of vegetable growing in hothouses, the hygienic aspects of the application of pesticides to hothouse soils are investigated in view of the special attendant conditions (high temperatures and humidity, which contribute to a rapid proliferation of pests, and the need for an increased application of pesticides in view of the greater area of foliage, as well as the insects' rapid development of tolerance to pesticides). Because the doses of pesticides applied to hothouse soils are particularly large, there exists the danger of contamination of hothouse personnel, especially as the toxicity of pesticides increases at high temperatures and in the presence of humidity which increases the moistness and temperature of the skin and thus facilitates the penetration of gas- and vapor-forming substances into the body. Clearly, the recorded air contamination level is inadequate as a criterion for hygienic safety of premises. It is absolutely necessary to allow for the total intake of pesticides via the respiratory tract and the skin when determining potential danger of every particular pesticide to hothouse personnel. Another major problem is to reduce the pesticide contamination levels of hothouse produce as well as to decontaminate soil substrates, vegetation residues and stagnant waters in hothouses. Hygienists should actively participate in setting up a certification system for pesticides applied to sheltered soils and drafting rules for a safe use of pesticides. References 11: 8 Russian, 1 Polish, 2 Western.

USSR

UDC: 611.1:539.4

#### ANALYSIS OF THE DYNAMICS OF ARTIFICIAL HEART VALVES

Rigz MEKHANIKA KOMPOZITNYKH MATERIALOV in Russian No 3, 1979 pp 537-539  
manuscript received 28 Dec 78

AGAFONOV, A. V., and KISELEV, S. N., Institute of Cardiovascular Surgery,  
imeni A. N. Bakulev, USSR Academy of Medical Sciences, Moscow, and the  
Moscow Institute of Railroad Engineers

[Abstract] Mathematical studies were conducted under in vitro conditions to determine the forces acting on a ball-type mitral valve (MKCh-2-25), in conjunction with sonographic data obtained on patients with implanted valves. Such information can be used for estimation of the effective lifetime and reliability of artificial heart valves.

USSR

UDC: 539.135:611.1

#### INTEGRAL ASSESSMENT OF THE HYDRODYNAMIC PROPERTIES OF ARTIFICIAL AORTIC VALVES

Riga M<sup>E</sup>KHANIKA KOMPOZITNYKH MATERIALOV in Russian No 3, 1979 pp 524-527  
manuscript received 28 Dec 78

[Abstract] Mathematical treatment was accorded to the evaluation of a series of artificial aortic valves, based on the Navier-Stokes equation of motion for a viscous fluid. Derived numerical data are presented for AKCh-1-02, AKCh-1-06, AKCh-1-20, AKCh-1-21, and a slitanchor ring type valves. Tables 1; references 4: 1 Western, 3 Russian



## GROWTH OF MOLDS ON GLASS-WOOL SUBSTRATES

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian No 2, 1979 pp 122-126  
manuscript received 1 Aug 78

BOBKOVA, T. S., BESSMERTNAYA, Z. G., CHEKUNOVA, L. N. and ZLOCHEVSKAYA, I. V., Department of Lower Plants Moscow State University imeni M. V. Lomonosov

[Abstract] Sitalls are polycrystalline materials obtained by crystallizing glass and have been widely used in the electronics, machine building and other industries. Eight sitall brands (S-8, S-10, K-37, KP-10, KP-15, SA-3 and Ts-r) were evaluated for their resistance to nine fungal species. (Aspergillus niger, A. flavus, A. terreus, A. versicolor, A. tonophilus, Penicillium cyclopium, P. brevi-compactum, Paecilomyces variotii and Trichoderma lignorum). Sitall S-8 samples placed on wort agar and infected with spore suspensions with the addition of sucrose were rapidly covered with mycelium. Fungal growth on samples without the additional nutrient was weaker. Analysis of the fungistatic effect of different heavy metal oxides revealed that lead, tin or niobium oxides had no effect on fungus resistance. Vanadium oxide slightly suppressed fungal growth, whereas cobalt and copper oxide completely prevented fungal growth at 1% by weight concentrations. Fungal spores applied to cleaned sitall surfaces germinated after 2 days and conidia formation began by Day 5-7. Fungal colonies were visible on all sitalls except S-10. Mycelial growth intensified if a nutrient substrate was present or near the samples. Only three-four species grew on samples after infection with nine species that were not antagonistic. P. variotii did not grow on any samples; Aspergillus spp. predominated with A. flavus as the dominant species. A. terreus was also found on samples; T. lignorum as the dominant species. A. terreus was also found on samples; T. lignorum was isolated less often and A. tonophilus very rarely. Fungal growth differed in intensity on the side surfaces of samples, particularly at the medium-sample boundary and also in defective areas. Prolonged contact with a weakly dispersed mycelium and short-term contact with an abundant mycelium did not alter sample appearance; the mycelium could be removed readily from the surface. With a 7-month exposure to heavy mycelial growth, the samples lost their gloss and dark or rusty spots remained on the surface from which the mycelia were removed. The fungi affected the sample surface only and not its interior. Fungal growth on sitall products seems improbable since the combination of conditions necessary for abundant fungal growth (high spore density, nutrient concentration, elevated temperature and humidity) is highly unlikely. It is recommended that sitalls the physical and chemical properties of which are not affected by fungal growth should be considered fungus resistant in compiling the appropriate national standards. References 5; Russian

**EFFECT OF THE MAGNITUDE OF TURBULENT PULSATIONS ON OXYGEN CONSUMPTION IN THE FERMENTATION PROCESS**

Moscow *KHIMIKO-FARMATSEVTICHESKIY ZHURNAL* in Russian Vol 13 No 5, May 79  
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KUZ'MINA, L. M., BIRYUKOV, V. V. and GORDEYEV, L. S., Moscow Chemico-Technological Institute imeni D. I. Mendeleev and All-Union Scientific Research Institute of Antibiotics, Moscow

[Abstract] Stirring is a major factor affecting the rate and final results of the processes of microorganism cultivation. Hence the elucidation of the mechanism of stirring is important to the solution of problems of scale transition, selection of the design of fermenters and mixing devices, and optimal control of stirring in the course of the process. In this connection, published experimental data on the effect of the degree of mixing of a model of variable segregation scale, formulas linking the unit oxygen consumption rate to technological and equipment characteristics are derived. It is shown that consideration of the mechanism of segregation makes it possible to allow for the effect of the principal technological factors (viscosity of fluid, concentration of mycelium, stirring rate) on the rate of the consumption of oxygen by the biomass of microorganisms. In this connection, the nonisotropic nature of turbulence in manufacturing apparatus must be taken into account. In the presence of nonisotropic turbulence, respiration rate decreases, and hence stirring equipment should be designed to assure a more uniform distribution of the input power. This is an urgent problem as regards the processes of the biosynthesis of antibiotics that are characterized by the use of viscous fluids with a high biomass content. Figures 4; references 13: 7 Russian, 6 Western.

**DECONTAMINATION OF RECYCLED WATER AT STATIONS FOR WASHING LONG DISTANCE TRAINS**

Moscow *GIGIYENA I SANITARIYA* in Russian No 1, 1979 pp 84-85 manuscript received 8 Jun 78

POLYAKOVA, V. A. and LAKSHIN, A. M., candidates of medical sciences, PASHININA, O. M., ZAKHAROVA, T. B. and DANKINA, N. K., All-Union Scientific Research Institute of Railroad Hygiene, Moscow

[Abstract] The use of recycled water at stations for washing long distance

passenger trains saves about 300 cu m of water daily (7000 cu m annually). In this connection, the sides of passenger railroad cars were found to be infested with large numbers of helminth eggs and bacteria. These microorganisms may enter the recycled water and re-contaminate those railroad car surfaces with which contact by passengers and servicing personnel is most often likely (handles, doors, windows, etc.). Since recycled water of this kind is of epidemic danger to passengers and railroaders, its purification also requires decontamination. The thermal method of decontamination was found to be the simplest, economical, and technically justified. The coli index of water after treatment at level 10 (coli titer 100) was found to be the criterion of effective decontamination. In this connection, a study of the effectiveness of the decontamination was performed in the train-washing area of the Moscow-Nikolayevskaya Station. Samples of recycled water that had been decontaminated by heating in a TL-150 ultrathermostat at various temperatures (50, 60, 70, and 80°C) for from 10 to 30 min were collected and analyzed for bacterial count, coli titer and coli index, turbidity, sediment, transparency, pH, oxidability, smell, suspended matter, and matter soluble in ether. It was established that the most effective decontamination of recycled water was accomplished by heating at 60°C for 30 min or at 70°C for 10 min (in winter and spring) and 20 min (in summer). Further, the water purification facilities at train-washing stations should be complemented with equipment for removing ether-soluble and suspended matter from the recycled water. It is recommended that these findings be applied in practice in the operations of railroad car washing stations in the USSR following operating trials. References 3; Russian.

USSR

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#### EFFECTS OF ORNID ON THE REGULATION OF CEREBROVASCULAR CIRCULATION

Moscow BYULLETen' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 87 No 5, May 79 pp 427-429 manuscript received 12 May 78

MIRZOYAN, R. S., Laboratory of Nervous System Pharmacology, Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow

[Abstract] Pharmacologic studies were conducted on cats to determine the effects of bretylium tosylate (BT; Ornid) on cerebrovascular circulation following intravenous administration of 10 mg/kg of BT. Bt, a sympatholytic agent, was found to diminish the rate of cerebrovascular blood flow and increase cerebrovascular resistance. Vascular constriction was apparently due to BT's effects in promoting norepinephrine release and in acting as an adrenergic blocker. BT altered neural control of cerebrovascular circulation by counteracting constriction of the blood vessels due to stimulation of sympathetic and afferent somatic nerves. However, the administration of BT did not alter the acid-base balance of arterial blood or of the CSF, thus excluding pH changes from the mechanism of action of BT. Figures 2; references 8: 3 Western, 5 Russian.

USSR

UDC: 616-006.092:[615.371:576.852.211

#### RESISTANCE OF BCG VACCINATED RATS TO TUMOR GROWTH AFTER CYCLOPHOSPHAMIDE TREATMENT AND DESENSITIZATION

Moscow BYULLETen' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 87 No 5, May 79 pp 462-465 manuscript received 4 Jul 78

VOLEGOV, A. I., TROFIMCHUK, S. M. and ZYKOV, YU. V., Pathophysiology Laboratory, Moscow Scientific Research Oncologic Institute imeni P. A. Hertzen, and the Scientific Research Laboratory of Experimental Immunobiology, USSR Academy of Medical Sciences, Moscow

[Abstract] Four-month-old male Wistar rats were employed in research on the relationship of tuberculin hypersensitivity and tumors growth, with the animals divided into a control group (I), tuberculin sensitized group (II), sensitized + cyclophosphamide-treated group (III), and sensitized + cyclophosphamide + desensitized group (IV). Cyclophosphamide treatment commenced 25 days after BCG sensitization; desensitization with PPD[dry purified tuberculin] commenced 41 days after sensitization. The cyclophosphamide regimen consisted of 20 mg/kg/day for 4 days, intraperitoneally. The animals were challenged with a subcutaneous implant of Walker's carcinosarcoma cells 22 days after desensitization and 82 days after



sensitization was established. Determination of tumor growth in the different groups 3, 6 and 10 days after implantation yielded the following data (in  $\text{cm}^3$ ) for group I rats: 0.36, 26.5, and 42.9. The corresponding average values for group II rats were 0.73, 31.2, and 45.6; for group III 0.37, 21.4, and 34.2; and for group IV 0.46, 23.0 and 45.41. The present data are compatible with the interpretation that any manipulation of the immune system promotes tumor growth and contradicts the hypothesis that nonspecific hypersensitization may retard such growth. The positive effects in group III rats, in terms of tumor inhibition, are ascribed to the efficacy of cyclophosphamide chemotherapy. Figures 1; references 15: 4 Western, 11 Russian.

USSR

UDC: 616.13-004.6-092.9-085.272.4

#### EFFECT OF URSOLIC ACID AND ITS DERIVATIVES ON LIPID METABOLISM IN EXPERIMENTAL ATHEROSCLEROSIS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 13 No 4, Apr 79  
pp 10-16 manuscript received 11 Jul 78

PARFENT'YEVA, YE. P., Pyatigorsk Pharmaceutical Institute

[Abstract] This is a continuation of an earlier investigation which established the hypolipidemic effect of the complex of triterpene substances extracted from thyme, which consists mainly of ursolic acid (Vasilenko, Yu. K. et al., 1976). The effect of the following substances on the indicators of lipid metabolism in experimental atherosclerosis has now been investigated: I) ursolic acid; II) ursolic acid acetate (acetylation with respect to hydroxyl group at  $\text{C}_3$ ) III) methyl ester of ursolic acid (methylation with respect to carboxyl group); IV) and methyl ester of ursolic acid acetate (bonding of hydroxyl and carboxyl groups. Acid I was selectively extracted from lavender grass. The acetylation of ursolic acid was accomplished by means of acetic anhydride, while III and IV were obtained by methylation with dimethyl sulfate. Experiments were performed on 111 rabbits in whom experimental atherosclerosis was induced. The investigated substances were administered in feed at a level of 10 mg/kg together with cholesterol (200 mg/kg), daily for 3 months ("prophylactic" effect) or for 2 months following 3-month feeding with cholesterol ("Therapeutic" effect). Of the four substances investigated, acetylated ursolic acid (II) produced the most potent hypolipidemic and antiatherosclerotic effect. Experiments with the separation of the lipoproteins of the blood serum of rabbits given II revealed a decrease in the beta fraction (low-density lipoproteins) and increase in the alpha fraction (high-density lipoproteins), along with a decrease in the cholesterol content of blood. Apparently, II promotes the redistribution

of cholesterol from the beta-fraction to the alpha fraction; this accounts for the mechanism of the antiatherosclerotic effect of triterpene acids. Further, it can be assumed that the low content of free cholesterol in rabbits given II is associated with the inhibition of lipoproteinlipase activity by the metabolites of II. References 26: 21 Russian, 5 Western.

USSR

UDC: 615.277.3:547.495.4

#### TUMOR CONTROL ACTIVITY AND MECHANISM OF ACTION OF N-ALKYL-N-NITROSOUREA

Moscow KHIMIKO-FARMATESEVTICHESKIY ZHURNAL in Russian Vol 13 No 4, Apr 79 pp25-34, manuscript received 12 Nov 78

GORBACHEVA, L. B. and KUKUSHKINA, G. V., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] N-nitroso-N-alkylureas (NAU) represent an interesting and promising class of antitumor compounds. In this connection, the antitumoral activity and mechanism of action of such compounds in this class as 1,3 bis-(2-chloroethyl)-1-nitrosourea (I), 1-(2-chloroethyl)-3-cyclohexyl-1-nitrosourea (II), 1-(2-chloroethyl)-3-(4-methylcyclohexyl)-3-nitrosourea (III), and 1-methyl-1-nitrosourea (IV), as well as their derivatives, are surveyed. The structural formulas of the derivatives are presented. The antitumoral activity of NAU is associated with the fact that in aqueous solutions, in near-physiological conditions, NAU are unstable and readily decompose with the formation of e. g., alkyl carbonium ions, capable of alkylating the nucleophilic centers of nucleic acids, and isocyanates, which readily carbamoylize proteins and lipids. The mechanism of action of NAU is such that they disrupt DNA chains, cause the appearance of alkali-labile sites, the formation of inter- and intra-molecular cross-linkages, and the formation of cross-linkages between DAN and proteins. NAU also disrupt the synthesis and structure of RNA. The effects of NAU vary depending on which particular NAU compound is used. The analysis of new information about the biological activity and mechanism of action of a number of NAU derivatives shows that the antitumoral potential of these agents is far from exhausted. New and less toxic active NAU derivatives have recently been synthesized, while the already known drugs, I, II, III, and IV continue to be broadly tested in procedures for combined therapy of oncological patients. References 55: 6 Russian, 49 Western.

INVESTIGATION OF THE RELATIONSHIP BETWEEN STRUCTURE AND BIOLOGICAL ACTIVITY  
IN DISCRETE MANIFESTATION OF BIOLOGICAL ACTION. REPORT I: DESCRIPTION  
OF PROCEDURE

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 13 No 4, Apr 79  
pp 34-37 manuscript received 15 Nov 78

ORDUKHANYAN, A. A., KABANKIN, A. S. and LANDAU, M. A., Scientific Research  
Institute of Biological Testing of Chemical Compounds, Moskovskaya Oblast

[Abstract] The approach adopted here to investigate the patterns of structure-activity relationships has been based on the apparatus of discriminant analysis. An input sample of test compounds whose biological activity is evaluated on a discrete scale in order to determine optimally, the domains in some space of physico-chemical parameters that correspond to compounds with identical activity. The answer is obtained by means of the Bayes solution in the form of linear discriminant functions. The domains corresponding to the same class consist of points in the space of parameters for which the same discriminant function is maximal. The ultimate objective of the analysis is the prediction of new biologically active compounds. A corresponding computer procedure, based on 20 iterative steps, is described. The resulting program CLASS, written in Fortran-Dubna language is addressed to the subroutines DISCR, MINV, DMATX, and RANDU. Implementation of this program has shown that the proposed procedure results in the true minimum of the integral loss function for any number of physico-chemical parameters, on the principle that compounds of the same degree of activity form the same class, so that the problem reduces to compiling the rules for the classification of compounds by class of biological activity. References 13: 5 Russian, 8 Western.

USE OF THE METHOD OF DISCRIMINANT ANALYSIS TO DIFFERENTIATE AMONG VARIOUS  
FORMS OF PSYCHO- AND NEUROTROPIC ACTIVITY

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 13 No 4, Apr 79  
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LEKSINA, L. A., KABANKIN, A. S., LAVRETSKAYA, E. F., LANDAU, M. A. and  
VOLKOVA, L. I., Scientific Research of Biological Testing of Chemical  
Compounds Moskovskaya Oblast

[Abstract] This is a continuation of a previous study (Lavretskaya, E. F., et al KHIM-FARM. ZH., No 8, 1977, pp 41-47) which demonstrated the possibility of predicting the type of psychotropic activity of chemical compounds according

to the findings of primary pharmacological tests on mice, as based on the method of discriminant analysis serving to classify the investigated compounds into one quality group or another according to the results of quantitative tests. In that study, linear discriminant functions serving to differentiate between 5 classes of drugs—soporifics, tranquilizers, psychostimulants, neuroleptics, and antidepressants—have been derived. Now certain other groups of drugs not investigated in that study are considered. Thus, cholino- and adrenomimetics may behave in certain tests as psychostimulants while cholino- and adrenolytics may behave as sedatives or antidepressants. Hence the discriminant analysis method is now used with respect to these previously unconsidered drugs. Calculations performed on a BESM-6 computer according to a standard routine were used to derive the optimal discriminant functions for the following combinations of groups, as based on the results of primary experimental tests: psychostimulants and adrenomimetics; antidepressants and adrenolytics; psychostimulants, cholinomimetics, and cholinesterase inhibitors. In all cases test findings on two doses (with minimum and maximum effects) were utilized. References 3; Russian.

USSR

UDC: 615.21:547.861.3'751

SYNTHESIS AND NEUROTROPIC ACTIVITY OF HETEROCYCLIC DERIVATIVES OF  
1-PIPERAZINOALKYLINDOLES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 13 No 4, Apr 79  
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ZEMSKIY, B. P., STUPNIKOVA, T. V., SHEYNKMAN, A. K., KOMISSAROV, I. V.,  
MARSHUTPA, V. P., DONETS, V. F. and FILOBOK, M. I., Donetsk State University  
and Donetsk Medical Institute imeni M. Gor'kiy

[Abstract] Considering that certain piperazinoalkylindoles and indolines display sedative, hypotensive, temperature-reducing, antipyretic, and tranquilizing effects, the authors derived certain heterocyclic derivatives of 1-piperazinoalkylindole with the object of investigating the effect of the position of substitutes in the indole ring on the physiological activity of these compounds. The structural formulas of these derivatives are presented. Investigation of the biological activity of these compounds, performed by the standard methods of neuropharmacological screening in experiments on mice and rats, showed that the most distinct depressant effect on the central nervous system was produced by the original 1-piperazinoalkylindole itself, whereas transposing the piperazinoalkyl group in indole derivatives from position 1 to positions 3 and 5 results in a reduction of both toxicity and activity. References 6: 4 Russian, 2 Western.



## SYNTHESIS AND PHYSIOLOGICAL ACTIVITY OF WATER-SOLUBLE 9-SUBSTITUTED 6-MERCAPTOPURINES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 13 No 4, Apr 79  
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SHLUKE, YA. YA., PORITERE, S. YE., DRAKE, R. B., ZIDERMANE, A. A. and LIDAK, M. YU, Institute of Organic Synthesis, Latvian SSR Academy of Sciences and Riga Scientific Research Institute of Traumatology and Orthopedics

[Abstract] 6-Mercaptopurine and a number of its derivatives are widely used in treatment of acute leukosis, and some of these compounds particularly 6-(1-methyl-4-nitroimidazole-5) mercaptopurine, can suppress immune responses of the body. But previously these compounds were relatively insoluble in water, which complicated their parenteral administration. Now the authors developed water-soluble derivatives of 6-mercaptopurine by placing in the 9 purine ring such hydrophilic groups as dihydroxypropyl, dihydroxybutyl, aminocarboxyamyl, and aminocarboxybutyl groups. The derivatives were synthesized by thionation of 9-substituted chloropurines. The immunodepressant effect of these water-soluble derivatives was tested on a skin homotransplant model in mice with tissue incompatibility between donor and recipient. Their toxicity was found to be lower than that of 6-mercaptopurine and their water-soluble nature assures their parenteral administration so that this class of purine derivatives is of promise for further research. In addition, experiments on mice showed that the water-soluble 9-substituted 6-mercaptopurines also display antitumoral activity. References 7: 6 Russian, 1 Western.

## SYNTHESIS AND PHARMACOLOGICAL ACTIVITY OF CERTAIN DERIVATIVES OF 3,5'-bis-1N-INDOLE

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 13 No 4, Apr 79  
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CHILIKIN, L. G., GORELOVA, N. V., SHVARTS, G. YA. and SUVOROV, N. N., Moscow Chemico-Technological Institute imeni D. I. Mendeleyev

[Abstract] This is a continuation of an earlier study (Suvorov, N. N., et al., 1978) which resulted in synthesis of the new bicyclic system of 3,5'-bis-1N-indole. Here, synthesis of 4-(2-carbethoxyindolyl-3)-phenylhydrazone of the ethyl ester of  $\alpha$ -keto-6-phthalimidovalerianic acid is described, with cyclization of that acid resulting in the synthesis of 2,2'-dicarbethoxy-3,5'-bis-1N-indole whose saponification, decarboxylation,

and subsequent hydrazinolysis result in the synthesis of 5-(indolyl-3)-tryptamine. The cyclization of 4-(2-carbethoxyindolyl-3)-phenylhydrazone of diethyl ester of glutaric acid resulted in the synthesis of 2,2'-dicarbethoxy-5-(indolyl-3')-indolyl-3-acetic acid, whose saponification, monoesterification, decarboxylation, and hydrolysis result in 5-(indolyl-3)-indolyl-3-acetic acid. The radiation protecting activity of the hydrochloride of 5-(indolyl-3)-tryptamine proved to be higher than that of triptamine, but lower than that of mexamine. Its toxicity is too high (LD<sub>50</sub> 70 mg/kg under intravenous administration). Data on the IR, UV, and PMR spectra of the synthesized compounds are presented. References 5: 2 Russian, 3 Western.

USSR

UDC: 615.31:547.876

#### SYNTHESIS AND PROPERTIES OF PYRIDO[2,3-e]-1,2,4-THIADIAZINE-1,1-DIOXIDES

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KOTOVSKAYA, S. K., MOKRUSHINA, G. A., POSTOVSKIY, I. YA., PIDEMSKIY, YE. L.,  
GOLENEVA, A. F. and VYSOKOVA, T. YU., Ural Polytechnic Institute imeni  
S. M. Kirov, Sverdlovsk, and Perm' Institute of Natural Sciences

[Abstract] The synthesis and pharmacological properties of pyrido[2,3-e]-1,2,4-thiadiazine-1,1-dioxides are described. It is shown that pyrido[2,-e]4-methyl-1,2,4-thiadiazine-1,1-dioxide displays a distinct antipyretic and analgesic activity, comparable to the activity of phenylbutazone and amidopyrine. Pyrido[2,3-e]-1,2,4-thiadiazine-1,1-dioxide displays a moderate antipyretic and analgesic activity. 3-substituted pyrido[2,3-e]-1,2,4-thiadiazine-1,1-dioxides display analgesic activity. All the investigated compounds were relatively nontoxic (LD<sub>50</sub> > 500 mg/kg). A table of physicochemical properties of these compounds is presented. References 12: 1 Russian, 12 Western.

## PREDICTION OF THE SOLUBILITY OF BIOLOGICALLY ACTIVE COMPOUNDS UNDER SCREENING CONDITIONS. II: ADDITIVE AND SEMIEMPIRICAL APPROACHES

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EPSHTEYN, N. A. and NIZHNIY, S. V., Scientific Research Institute of  
Biological Testing of Chemical Compounds, Moskovskaya Oblast

[Abstract] Solubility prediction on the basis of data on chemical structure of substances is useful to include in the system of tests of the biological action of a large number of chemical compounds. Some ways of solving this problem were described in a preceding communication (Ephsteyn and Nizhniy, KHIM.-FARM. SHURNAL, No 3, 1979, p 48). Now the principle of the additiveness of contributions made by substitutes or by definite fragments of structure to overall solubility, as well as the use of semiempirical formulas for this purpose, is considered. Since the process of solution in a standard solvent is exclusively determined by the physico-chemical properties of molecules most of which are additive, it can be assumed that, in a first approximation, solubility can be expressed as the sum total of contributions by individual atoms, atom groups, and bonds. Accordingly, data on the solubility of organic substances in water at 25°C are used to compute and tabulate solubility increments  $\Delta_R + \Delta \log L/N_S$  (1) for 200 substances, and to calculate the correlations  $\log lN_S - \log P$  (2) and  $\log 1/N_S - \chi$  (3), where  $N_S$  is the solubility,  $P$  is the octanol-water distribution factor, and  $\chi$  is molecular bonding power. The possibility of predicting solubility correct to  $\Delta \log 1/N_S = \pm 1.0$  on the basis of formulas (1) in the presence of 3-4 substitutes (or fragments) is concluded. Correlation formula (2) assures an analogous accuracy of prediction with a probability of about 70%. Under conditions of mass tests this additive approach to the calculation of solubility can be used to select the preferred solvent and to facilitate the practical determination of the extent of solubility. References 27: 8 Russian, 19 Western.

HARVESTABLE RESOURCES OF *Dioscorea nipponica* IN THE JEWISH AUTONOMOUS OBLAST

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 17 No 4, Apr 79  
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ISAYKINA, A. P., All-Union Scientific Research Institute of Medicinal  
Plants, Moskovskaya Oblast

[Abstract] *Dioscorea nipponica* (Makino) is a perennial dioecious herbaceous

liana of the Dioscoreaceae family. The rhizomes of *Dioscorea nipponica* serve as a raw material for producing the drug Polysponin used in the prevention and treatment of atherosclerosis. In the USSR dioscorea grows only in the Far East and is commercially harvested only in Primorskiy Kray. Hence, during 1976-1977 expeditions were organized to explore the extent and areas of growth of the dioscorea in the Jewish Autonomous Oblast (JEO). This paper deals with the extent of the harvestable resources of the dioscorea on discovered areas of its growth in the JEO. Altogether, on the 54 principal areas of wild dioscorea growth, the available resources are estimated at more than 80 tons in terms of dried rhizomes, which can be harvested at the rate of about 5 tons annually in terms of dried rhizomes, in order to assure natural restocking--mostly in the basin of the Amur River as well as on the mountains lining the Central Amur Plain. Commercial cultivation of this plant could increase this harvest by a factor of 2 or 3. References 4; Russian.

USSR

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-002.62

INVESTIGATION OF THE PROCESS OF OXIDATION OF 2,6-LUTIDINE BY POTASSIUM PERMANGANATE (KINETICS OF THE FORMATION OF DIPICOLINIC, 6-METHYLPICOLINIC, AND OXALIC ACIDS)

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 13 No 4, Apr 79 pp 72-78 manuscript received 7 Feb 78

YAKHONTOV, L. N., LEVKOYEVA, YE. I., MASTAFANOVA, L. I., KRASNOKUTSKAYA, D. M., YEVSTRATOVA, M. I., VOLZHINA, O. N., KLIMONOVA, Z. M., KARPMAN, YA. S., TUBINA, I. S., IVANOVA, I. L., MARKOVA, I. G. and KUZOVKIN, V. A., All-Union Scientific Research Chemico-Pharmaceutical Institute imeni S. Ordzhonikidze, Moscow

[Abstract] Dipicolinic acid is the principal raw material used to synthesize the antisclerotic drug parmidine. This acid itself is obtained by oxidizing 2,6-lutidine with potassium permanganate. The free acid is isolated from the oxidized solution by adding hydrochloric acid. To investigate this oxidation process in greater detail, a kinetic study of the change of the concentration of 2,6-lutidine in the solution with time, as well as of the potassium salts of 6-methylpicolinic, dipicolinic, and oxalic acids was carried out. To this end, potassium permanganate was added in 10 successive portions to a 4% aqueous solution of 2,6-lutidine at 70-75, 80-85, and 85-90°C. It is found that 2,6-lutidine is entirely oxidized within 6 hr. The concentration of dipicolinic acid reaches its maximum (4.2 g/100 cc) after the 10th portion of potassium permanganate is added (after 23 1/2 hr) and by then the amount of 6-methyldipicolinic



acid amounts to 0.32 g/100 cc--and steadily diminished henceforth. As for oxalic acid, its concentration reaches 1.36 g/100 cc after 23 1/2 hr and attains its maximum (2.05 g/100 cc) after 34 hr. Increasing the oxidation temperature accelerates these processes. Figures 2; references 9: 4 Russian, 5 Western.

USSR

UDC: 615.31:547.466.3].012

N-ACETYL-EPSILON-AMINOCAPROIC ACID. III: IMPROVED SYNTHESIS OF N-ACETYL-E AMINOCAPROIC ACID

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pp 78-80 manuscript received 8 Aug 78

YASNITSKIY, B. G., DOL'BERG, YE. B. and SPIVAK, A. D., Khar'kov Scientific Research Chemico-Pharmaceutical Institute

[Abstract] N-acetyl- $\epsilon$  aminocaproic acid (I) is the chief ingredient of the drug Acemin which is used to promote the healing of wounds and the concretion of bones. In this connection, a more efficient method for producing I from  $\epsilon$ -caprolactam (II) is described. Normally II yields, on interacting with acetic anhydride, N-acetyl- $\epsilon$ -caprolactam (III) which is hydrolyzed in water in the presence of a catalyst--acetic acid. Then water and acetic acid are driven off, acetone is added to the residue, and the solution crystallizes into I. After recrystallization from acetone the yield of I is 15%. To increase this yield, the authors experimented with various techniques of separation of I from the hydrolysate: extraction with organic solvents, evaporation with subsequent crystallization, segregation in the form of salts, etc. The best method proved to be the crystallization of the product directly from the reaction mixture upon its cooling to from -10 to -25°C. Then I is isolated in pure state, which precludes the need for recrystallization. The yield of I in the crystallization stage is affected by the amount of water used for the hydrolysis of III: the maximum yield of I is reached for the mass ratio III/water amounting to 1:1-1:3. Further, following the hydrolysis and isolation of I, the reaction solution still contains a considerable quantity of II that can be recovered and re-used. As a result of all these measures, the yield of I can be tripled in comparison with its current level. References 4: 2 Russian, 2 Western (including 1 French Patent).

## SELECTIVITY OF THE SORPTION OF IONIC FORMS OF LYSINE BY SULFOSTYRENE CATIONITE

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TER-SARKISYAN, E. M., KURUKOV, D. A. and YEVSTYUGOV-BARAYEV, L. M., All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow

[Abstract] L-lysine ( $\alpha$ ,  $\epsilon$ -diaminocaproic acid) and preparations based on it are of increasing interest as regards their effect on the human body. At present L-lysine for medical purposes is obtained from the commercial technical product manufactured by the method of microbiological synthesis with isolation by means of ion-exchange resins. The ion-exchange stage in this production can be improved. In this connection, the static ion-exchange equilibrium in the lysine-sulfocationite system in  $H^+$  and  $Na^+$  forms are investigated over a broad range of lysine concentrations in the solution and ionite. It is shown that, by contrast with the doubly-charged lysine cation, the selectivity factor of the sorption of the singly-charged cation is markedly affected by the lysine concentration in the solution and the ionic strength of the solution. It is established that exchange selectivity increases considerably with increase in the cross-linkage of the ionite. Figures 5; references 10: 6 Russian, 4 Western.

## IMPROVEMENTS IN THE TECHNOLOGY OF PRODUCTION OF MEDICINAL EMOLLIENTS WITH A HIGH CONTENT OF SOLID COMPONENTS

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GOVERT, V. F., LYGOREVA, V. A., BALABUDKIN, M. A. and YEZERSKIY, N. M., Borisovskiy Chemico-Pharmaceutical Plant, Leningrad Chemico-Pharmaceutical Institute, and Scientific-Production Association Progress imeni Leningrad

[Abstract] The existing technology of production of medical ointments and pastes with a high content of solid ingredients, e. g., the ointment Sunoref and zinc and salicyl-zinc pastes, is complicated and labor-consuming. To simplify this technology, the Borisovskiy Chemico-Pharmaceutical Plant has installed a new facility based on the roller-type homogenizer developed by the Leningrad Chemico-Pharmaceutical Institute in collaboration with the "Progress" Scientific-Production Association. The homogenizer is based on the operating principles of a miniature rolling mill. It can produce a batch of 400 kg of salicylzinc paste by the following procedure:

Vaseline (192.8 kg) heated to 50-60°C is charged into a centrifugal mixer and, after it cools to 40-45°C, zinc oxide (100 kg), starch (100 kg), and salicylic acid (8 kg) are added. After mixing for about 50 min, the homogenizer is turned on along with a gear pump for 15-20 min. The resulting salicyl-zinc paste is of a consistency and dispersity superior to that of the paste obtained by traditional production techniques. Commensurate savings in power consumption and labor requirements also are obtained. This new technology can also be applied to the manufacture of other medical emollients with high content of solid base. Figures 2; references 2: Russian.

USSR

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#### IDENTIFICATION AND DIRECT QUANTITATIVE ASSAY OF HEPARIN BY THE NMR-<sup>13</sup>C METHOD

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pp 92-97 manuscript received 19 Sep 78

SVERGUN, V. I., SMIRNOV, M. B. and PANOV, V. P., All-Union Scientific Research Institute of the Technology of Blood Substitutes and Hormonal Preparations, Moscow

[Abstract] Knowledge of the chemical character of the heparin obtained from the lungs of cattle is necessary for an effective solution of the tasks of production and quality control. Heparin content in solutions has so far been determined by the nuclear paramagnetic resonance (NPR) method based on proton magnetic resonance (PMR) spectroscopy, but the resolution thus achieved is poor. NMR<sup>13</sup>C based on Fourier spectroscopy is more promising. In this connection, it is shown that the identification of heparin content of a sample exceeds 5% according to the signal in the NMR-<sup>13</sup>C spectrum. Similarly, quantitative analysis of the content of heparin--and of attendant mucopolysaccharides--can be accomplished with the aid of the NMR-<sup>13</sup>C method as a function of the Overhauser effect, in cases in which the heparin content exceeds 10%. Figures 3; references 20: 3 Russian, 17 Western.

USSR

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CERTAIN PRINCIPLES FOR DEVELOPING COMPUTATIONAL ALGORITHMS OF THE TECHNICAL AND ECONOMIC PARAMETERS OF AUTOMATED PRODUCTION OF INSULIN

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KALINOV, B. P., GAITOV, F. Z., OVCHAROVA, S. A., and SHAMRAY, T. I., Groznyy  
"Promavtomatika" Scientific-Production Association

[Abstract] In view of the complicated and lengthy nature of the production of insulin, the algorithms needed for its automation must be correspondingly adapted. Despite the differences in the algorithms for computing scientific technical and economic parameters, the attendant computer programs follow virtually the same procedures: data retrieval, monitoring of the reliability of input information, monitoring of the reliability of rated parameters. It is thus possible to construct routines for the calculation and analysis of the parameters on the basis of system modules. Thus the parameters of discrete periodic processes can be computed so as to assure automatic monitoring of the batch during every stage of production. The modular principle of program construction serves to readily alter the functional possibilities of tasks, and it sharply reduces the volume of programs by not requiring their adjustment in cases of revisions in the structure of production and input data. Figures 1; references 4: Russian.

USSR

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INCAZAN, A NEW ANTIDEPRESSANT

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ANDREYEVA, N. I., GLUSHKOV, R. G. and MASHKOVSKIY, M. D., All-Union  
Scientific Research Chemico-Pharmacological Institute imeni S. Ordzhonikidze  
Moscow

[Abstract] The new antidepressant Incazan-hydrochloride of 3-methyl-8-methoxy-3N,1,2,5,6-tetrahydropyrazino(1,2,3,-ab)-~~8~~-carboline--developed by the All-Union Scientific Research Chemico-Pharmaceutical Institute imeni S. Ordzhonikidze is a white crystalline powder readily soluble in water, and has been synthesized in the laboratory of Prof. R. G. Glushkov. The structural formula of Incazan is presented, as are the results of its pharmacological investigation which showed that Incazan displays special antidepressant properties, anti-reserpine and central and peripheral adreno-



and serotonin-positive activity, similar to those of imiprazine-like substances, however, Incazan augments pressor responses to indirectly acting amines such as tyramine,  $\beta$ -phenylethylamine, and tryptamine. The new drug is relatively nontoxic: LD<sub>50</sub> for white mice on intravenous administration was 85 mg/kg; intracutaneous, 250 mg/kg. Based on these pharmacological studies, Incazan was subjected to clinical tests at a number of medical institutions. These tests showed that Incazan is an antidepressant in which the thymoleptic effect combines with a stimulant effect on the central nervous system. It does not produce cholinolytic side effects and, unlike imipramine, it does not intensify senestopathy and other pathological somatic sensations. Moreover, unlike amytryptiline, it does not cause muscular debility and somnolence. Its side effects are insignificant, but it is not advisable to use this drug in anxiety states since it may intensify anxiety. The drug is administered perorally in tablets of 0.025 g (25 mg) each. Its release has been authorized by the USSR Ministry of Health. References 2; Western.

USSR

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#### COMPUTATIONAL METHOD OF DETERMINING THE ION-EXCHANGE SORPTION OF LYSINE FROM CULTURE FLUID

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TER-SARKISYAN, E. M., KUTUKOV, D. S. and YEVSTYUGOV-BABAYEV, L. M., All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow

[Abstract] The crystalline L-lysine used for various reasons in medicine is isolated from culture fluid (CF) by means of ionites. In this connection, a method for computing the sorption of lysine on ionite as a function of conditions of exchange, the cation composition of CF, and the ionic form of the resin is presented. The sorption of lysine can be predicted by knowing the selectivity coefficients for the ionic forms, the exchange coefficients of the other cations, and the chemical composition of CF. A formula for the sorption of lysine from multicomponent systems is derived on the assumption that, first, the ion-pair exchange is independent of the filling of ionite by other ions, and second, the ion sorption selectivity coefficients are relatively independent of the concentration in the solution and in ionite, and, third, that the total static exchange capacity of cationite is identical for all the ions participating in the exchange. The validity of the derived formula and of the assumptions on which it is based was verified by investigating several multicomponent systems including from 3 to 5 cations under the conditions of a static ion-exchange equilibrium. The experimental findings were found to be in good agreement

with theory for the sorption of lysine from acidified solutions. The accuracy of the calculations decreased with increase in the concentrations of dissolved cations and especially of calcium. The presented computational method can be used to select optimal conditions of the sorption of lysine from CF, e. g., the pH value. Figures 3; references 6: Russian.

USSR

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#### ANTIMICROBIAL PROPERTIES OF TRIMETHYNQUINOCYANINES

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PATRATIIY, V. K., SIDORCHUK, I. I., STADNIYCHUK, R. F., TISHCHENKO, YE. I.,  
BURDENYUK, I. P. and PRODANCHUK, N. G., Chernovtsy Medical Institute

[Abstract] With the object of determining their antimicrobial properties, a number of trimethynquinocarbocyanines of asymmetric structure, containing various substitutes in position 9 of the polymethyn chromophore, was synthesized. Antimicrobial activity of these compounds was tested with respect to 12 strains of 8 species of bacteria and fungi of the genus *Candida* by the method of serial dilutions in liquid nutrient media selective with respect to specific microorganisms species. The trimethynquinocyanines were found to produce marked antimicrobial (bactericidal and bacteriostatic) effects on both gram-positive and gram-negative microorganisms, with the potency of that effect depending on the chemical structure of the investigated compounds: the substitution of the alkyl group in the  $\alpha$ -position of chromophore with the methoxy group enhances antimicrobial activity by a factor of 2. The strongest antimicrobial effect was produced by compound XII: it was found to act as a disinfectant with respect to *Staph. aureus* 209, *E. coli* 355, and *Bac. anthracoides*. It moreover is superior to phenol in that it acts as a disinfectant with respect to sporiferous bacteria. Its acute toxicity is low ( $LD_{50}$  36.4 mg/kg), and its 0.1-0.5% solutions produce no irritant effect on the mucous membrane of the eye and the damaged and intact skin of the guinea pig. References 8: Russian.

SYNTHESIS AND BIOLOGICAL ACTIVITY OF DERIVATIVES OF BETA-(INDOLYL-3)  
ACRYLIC ACID

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SHAMSHIN, V. P., SHESTKOV, V. P., YERMAKOV, A. I., VORONIN, V. G.,  
RABOTNIKOV, YU. M., USACHEV, YE. A. and ZAKS, A. S., Affiliate of the All-  
Union Scientific Research Chemico-Pharmaceutical Institute imeni S.  
Ordzhonikidze, Moskovskaya Oblast, and Perm' Medical Institute

[Abstract] With the object of determining their biological activity, the following derivatives of trans- $\beta$ -(indolyl-3)acrylic acid (I) were synthesized: dialkylaminoethyl esters (II, a-c), propargyl ester (II,d), quaternary salts of aminoesters (III,a-c, IV, a-c), and amides (V, a-e). The procedures for the synthesis of these derivatives are described. The obtained compounds were tested for analgesic, hypothermic, anticonvulsant, and antipyretic activity. Analgesic activity was tested in experiments on white mice by the "hot plate" method: compounds IId, IVa, and Va-e displayed no analgesic activity. As regards hypothermic action, tested in experiments on white mice by the rectal thermometry method, some decrease in temperature was observed 60 and 120 min after the administration of all these compounds. Compounds IId-Ve display no anticonvulsant activity as shown by the maximum electric shock method. As regards antipyretic activity, tested on the agar inflammation model, a distinct antipyretic effect, equal to that of amidopyrine, was produced by compounds IVc, Va,b,e. They are of no interest as antipyretics, since their required dosage for this purpose is fairly high (100 and 200 mg/kg). Of interest is the presence of antipyretic activity in the m-substituted anilides Vb and its absence in the n-isomers Vc,d. References 13: 4 Russian, 2 Czech, 7 Western.

ENCODEMENT OF STRUCTURAL INFORMATION IN INFORMATION RETRIEVAL SYSTEMS  
WITH LARGE ORGANIC COMPOUND DATA BANKS

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POLISHCHUK, YE. S., Scientific Research Institute of Biological Testing  
of Chemical Compounds, Moskovskaya Oblast

[Abstract] A major problem in the computerization of chemical data is the computerization of data on the structure of chemical compounds. Seen from the mathematical point of view, this problem consists in mapping a chemical tree by means of a sequence of symbols suitable for feeding

to the computer (encodement of structural formula). More than 100 different coding systems are mentioned in the published literature in this connection, and of these, linear and topological types of codes are the most pertinent, but one type is too ponderous while the other is too intricate. In this connection, a structural-formula coding system combining the advantages of the topological and linear systems with a simplicity of rules close to that of topological codes and a compactness close to that of linear codes is presented. It is termed the Linear-Topological Code (LTC). Its first version to be developed, LTC-1, is suitable for encoding chemical compounds whose structure can be transmitted by means of a system of simple, binary, and ternary bonds. The process of coding by the LTC-1 system consists of three stages: 1) numeration of atoms of the molecule; 2) filling the matrix of bonds; 3) encodement. The mean coding time per compound is about 5 min. The effectiveness of LTC-1 has been tested on a random sample of 120 chemical compounds (as a rule, of different types) from among those presented for biological tests. The mean length of coded notation for that sample was 34.9 symbols; since the mean number of nonhydrogen atoms in the molecules of that sample was 20.7, each atom required an average of 1.7 code-notation symbols. The rules of the LTC-1 encodement are simple and do not require special training in chemistry. References 2: Russian.

USSR

UDC: 615.217.5.015.11

RELATIONSHIP BETWEEN THE CHEMICAL STRUCTURE OF UREA DERIVATIVES AND THEIR ANTICONVULSANT EFFECT. IV. SUBSTITUTED BENZHYDRYLUREAS

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PECHENKIN, A. G., TIGNIBIDINA, L. G., GORSHKOVA, V. K. and TIKHONOVA, L. A.,  
Polytechnic Institute imeni S. M. Kirov, Tomsk

[Abstract] Benzhydrylurea displays a marked anticonvulsant activity in screening tests. In this connection, the synthesis of a number of new derivatives of benzhydrylurea with substitutes of the first R = H, alkyl, amino, ether, OH, NO<sub>2</sub>; R' = H and second R = HO<sub>2</sub>, alkyl, aryl, F, amino; R' = methyl or Cl kind in their benzene rings is described. The 21 synthesized substituted benzhydrylureas are substances of white color with specific melting points. A table of their constants and results of element analysis is presented. Pharmacological investigation of these compounds, as based on tests of maximum electric shock and cardiazol "titration," revealed that the insertion of substitutes of either the first or the second kind in one of the benzene rings (o- m-, n-positions) of benzhydrylurea results in reducing the anticonvulsant effect compared with nonsubstituted benzhydrylurea. At the same time, however, certain of



the synthesized compounds (II, III, VI, XII, XV) reliably raise the threshold of cardiazol convulsions and display anticonvulsant activity when tested by the maximum electric shock method on white mice (compounds II-IV, VI, X, XVI-XVIII, XXI). References 4: 1 Russian, 3 Western.

USSR

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#### NEUROTROPIC AND ANTIPYRETIC EFFECT OF THIOETHERS

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BOGOSLOVSKIY, N. V., KOLBINA, N. M., OBVINSTEVA, L. M. and PIDEMSKIY, YE. L.,  
Natural Sciences Institute at Perm' University

[Abstract] This is a continuation of an earlier study (Bogoslovskiy, N. V., et al. TRUDY URAL'SKIKH UN-TOV, Vol 3, 1975 pp 218-221) which showed that aromatic thioethers with the general formula  $\text{ArCAr'Ar''SAr}$  are relatively nontoxic and produce an analgesic effect. The biological properties of a number of aliphatic-aromatic sulfides with the general formula  $4\text{-CH}_3\text{OC}_6\text{H}_4\text{CH(R)SC}_6\text{H}_4\text{R}'\text{-4}$  have now been investigated with the object of revealing their neurotropic and antipyretic activity. Neurotropic activity was assessed according to the possibility of influencing the orientation response of mice and rats, hexenal narcosis, and the defensive response to pain, while antipyretic activity was investigated on models of formalin, dextran, serotonin, histamine, and agar inflammation. The investigated compounds were found to be relatively nontoxic, since their  $\text{LD}_{50}$  generally exceeded 500 mg/kg. The compounds produced a distinct sedative effect in inhibiting the orientation response in mice. Their antipyretic effect also was considerable. The low toxicity of the investigated thioethers along with their sufficiently-high phlogolytic activity, combined with a general sedative and analgesic effect, warrants further research into the synthesis of compounds of this type as potential antipyretics. References 16: 13 Russian, 1 East German, 2 Western.

EFFECT OF ETHANOL AND ACETALDEHYDE ON POSITIVE REINFORCEMENT STRUCTURES  
IN RATS

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian No 3, 1979 pp 291-293  
manuscript submitted 16 Mar 78

BUROV, YU. V. and BORISENKO, S. A., Laboratory for Research and Development  
Work on the Prevention and Treatment of Narcomania, Pharmacology Division,  
Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow

[Abstract] The effect of alcohol and of a product of its metabolism--acetaldehyde--on the structures of positive reinforcement of the hypothalamic level and septum in rats was investigated, as was the presence or absence of attraction toward alcohol in these animals under conditions of a free choice between water and ethanol. The experiments were performed on 22 male rats with electrodes implanted in the medial bundle of the forebrain at the level of the lateral hypothalamus or in the diagonal bundle of the septum. 7 days after the implantation, the rats were trained to develop the self-stimulation response by pressing a pedal and receiving brain-stimulating pulses. A 15% solution of ethanol was administered intra-abdominally in doses of 0.5, 0.75, 1, 2, and 4 g/kg, while acetaldehyde was administered intraabdominally in doses of 25, 50, 75, 100, and 100 mg/kg, 30 min prior to experiment. After the effect of ethanol and acetaldehyde on the auto-stimulation response in each rat was determined, the rats were placed for 14 days under conditions of free choice between water and the 15% ethanol solution. It was established that the smaller doses of ethanol activated the positive reinforcement structures of the hypothalamic level and septum, generally facilitating the auto-stimulation. By contrast, acetaldehyde produced an inhibiting effect on these structures. Under conditions of a free choice between water and ethanol, the rats in which ethanol facilitated auto-stimulation increased their intake of ethanol. Thus an explicit relationship was established between the ability of ethanol to activate the positive reinforcement structures and the formation of an attraction toward ethanol in rats, which may be due to the attendant rise of a distinctive emotional state in rats resembling euphoria in man. Acetaldehyde, in contrast, with its inhibiting effect, produces in rats a state similar to dysphoria in man. References 8: 4 Russian, 4 Western.

EFFECT OF ALPHA TOCOPHEROLACETATE AND SODIUM SELENITE ON THE CHANGE IN THE  
ATP CONTENT AND RNA SYNTHESIS RATE OF THE ISCHEMIC MYOCARDIUM

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manuscript received 18 Jul 78

KRASOVA, YE. I., NASTASHENKO, T. A., ONISHCHENKO, N. A., SEYFULLA, R. D.  
and KUVAYEV, A. YE., Laboratory of Immundodepressive Preparations and  
Organ Preservation, Institute of Organ and Tissue Transplantation, USSR  
Academy of Medical Sciences, Moscow

[Abstract] The effect of pre-administered  $\alpha$ -tocopherolacetate and sodium selenite on the dynamics of the change in certain indicators of plastic and energy metabolism at various stages of cardiac ischemia was investigated on male rats in which acute ischemia was induced by keeping the isolated heart in physiological solution at 37°C for various periods of time.  $\alpha$ -Tocopherolacetate (1 mg/kg, intramuscularly) and sodium selenite (1  $\mu$ g/kg, intraabdominally) were administered 2 hr prior to killing the animals. The rate of RNA synthesis was determined according to the rate of incorporation of  $^{14}$ C-uridine in the RNA of the sections of normal and ischemic myocardium. Concentration of adenine nucleotides was determined after first freezing the hearts in a liquid nitrogen atmosphere, by the enzymatic method with the aid of test sets manufactured by the Boehringer Company. The findings were expressed in micromoles per gram of moist tissue. It was established that prior administration of  $\alpha$ -tocopherolacetate and sodium selenite in the above doses contributes to preservation of the ATP level following 30- and 60-min ischemia and assures a higher level of the exchange of nucleic acids, thus enhancing the regenerative potential of the myocardium. On this basis, and in view of the literature data, the administration of these two drugs for purposes of myocardial prophylaxis is definitely justified. Figures 3; references 15: 8 Russian, 7 Western.

## PHARMACOLOGICAL ACTIVITY AND TOXICITY OF CERTAIN NEUROTROPIC AGENTS IN CONDITIONS OF EXPERIMENTAL HYPODYNAMIA

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian No 3, 1979 pp 221-225  
manuscript received 10 Feb 78

KIRICHEK, L. T., Chair of Pharmacology, Khar'kov Medical Institute

[Abstract] The pattern and degree of variation in the pharmacological activity and toxicity of such neurotropic agents as sodium oxybutyrate, barbamil, amizyl, reserpine, morphine, analgine, strychnine, ethymisol, eleutherococcus, ephedrine, and melipramine, in the early stages of experimental hypodynamia were investigated. The experiments were performed on 2600 white rats in which short-term (24-hr) hypodynamic was induced. Pharmacological activity was evaluated according to the manifestation of symptoms peculiar to each drug, as observed visually or instrumentally, while toxicity was evaluated as a function of the death of animals. The findings were used to determine for each drug its ED<sub>50</sub>, LD<sub>50</sub>, pharmacological range index, risk index, and the toxic activity zone, as well as the resistance of the animals in terms of maximum tolerable and absolutely lethal doses. It was established that in the animals subjected to the experimental hypodynamia the mechanism of action of neurotropic agents was essentially the same as in controls, producing the same symptoms. Similarly there was no change in toxicity. However, the pharmacological activity of these drugs then increases, as reflected in the decrease in ED<sub>50</sub> and increase in pharmacological range, except for barbamil and ethymisol. Thus, hypodynamia, which induces anxiety and stress in animals, affects the body's susceptibility to neurotropic drugs. References 4: Russian.

## COMPARATIVE STUDY OF THE EFFECT OF TRANQUILIZERS ON REINFORCEMENT SYSTEMS

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian No 3, 1979 pp 203-207  
manuscript received 28 Dec 78

MA USOV, I. V., Chair of Pharmacology, First Leningrad Medical Institute  
imeni Academician I. P. Pavlov

[Abstract] The effect of a broad variety of doses of various tranquilizers on positive- and negative-reinforcement properties of central electrostimulation was investigated on 20 white rats implanted with monopolar electrodes in the region of the lateral hypothalamus and medial lemniscus.



A week after the implantation, the auto-stimulation response began to be developed in rats within a Skinner box in which, every time the pedal was pushed, the animal received electrical brain stimulation. In rats with electrodes implanted in the region of the medial lemniscus, the response of active avoidance of aversive electrical brain stimulation was developed in a T-shaped maze. The effect of various benzodiazepine tranquilizers (diazepam, nitrazepam, phenazepam, grandaxin, and others) administered to the rats perorally 1 hr prior to experiment, as compared with controls, was investigated. The benzodiazepine tranquilizers applied in various doses (0.5-5 mg/kg) were found to accelerate the auto-stimulation response, and in the case of diazepam this was accompanied by an enhancement of spontaneous motor activity, while in the case of nitrazepam, phenazepam, and grandaxin the facilitation of auto-stimulation was accompanied by a general sedative effect. Diazepam, nitrazepam, and phenazepam administered in small doses reduce the latent period of the exclusion of central aversive electrostimulation. The phenothiazine tranquilizer elroquil on the other hand, suppresses exploratory activity in the auto-stimulation and avoidance responses. Thus, on the whole, the auto-stimulation response can serve as a sensitive method for testing psychotropic drugs in the preclinical stage so as to predict the potential tranquilizing and euphorizing properties of new medical drugs. Figures 1; references 9: 5 Russian, 4 Western.

USSR

UDC: 577.11+612.8.015:547.96+616.011+591.111.1

**BROMTHYMOL BLUE PREALBUMIN IN THE SERA OF RATS SUBJECTED TO HYPERBARO-OXYGENATION**

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 87 No 5, May 79 pp 417-419 manuscript received 3 Apr 78

SINICHKIN, A. A. and PROKOF'YEV, V. N., Biochemistry Chair, Rostov University, and the Laboratory of Mechanisms of Ecologic Adaptation of Animals to Extreme Environmental Factors, Scientific Research Institute of Biology, Rostov University

[Abstract] Polyacrylamide disc electrophoretic and immunochemical studies were conducted on rat brain bromthymol blue prealbumin (BTBP), which contains at least 6 components including a neurospecific S-100 protein and 2 proteins (a and b) common to all tissues, as found in the serum compartment following hyperbaric oxygenation (30-35 min at 6 atm, with 3 min compression and decompression times). An episode of acute oxygen toxicity resulted in 3-fold elevation of serum levels of BTBP, and 11% increase in total serum proteins, and the appearance of protein S-100 in the serum. Serum levels of protein-a (similar to neurophysin in physiochemical terms) increased 7-fold, while protein-b concentration remained unaltered. The data were interpreted to indicate that oxygen toxicity promoted alterations in the blood-brain barrier which led to the release of tissue-specific and nonspecific proteins from the brain into the general circulation. Figures 1; references 12: 1 Ukrainian, 3 Western, 8 Russian.

USSR

UDC: 616.831-008.9-02:616-008.922.1-008.64

**EFFECTS OF CEREBROVASCULAR HYPOTHERMIC PERFUSION ON THE METABOLISM OF THE ISCHEMIC BRAIN IN THE DOG**

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 87 No 5, May 79 pp 410-412 manuscript received 30 Mar 78

RADUSHKEVICH, V. L., MALYSHEV, V. V. and ALEKSANOV, A. A., Chair of General Surgery, Central Scientific Research Laboratory, Irkutsk Medical Institute

[Abstract] The effects of normothermal (37.2°C) and hypothermic (4.5°C) cerebrovascular perfusion with a colloid-saline 'extracellular' perfusate (0.3 g KCl, 1.5 g NaHCO<sub>3</sub>, 1.2 g glucose, 2 U insulin, 1 g GOMK [sic], 0.3 ml heparin, 290 ml rheopolyglan, 660 ml gelatinol per one liter water) on brain metabolism were investigated on morphine-pretreated 10-21 kg dogs in agonal stages of exsanguination. Evaluation of the levels of

various metabolites in brain tissue and in effluents indicated that in situations of acute brain hypoxia normothermal and hypothermal cerebrovascular perfusion alleviated the extent of metabolic disruption; maintenance of metabolic homeostasis was especially pronounced with hypothermic perfusion which, in addition, partially reversed hypoxia-induced activation of anaerobic glycolysis. References 3: Russian.

USSR

UDC: 617-0001.17-092.9.-07:616.127-008.1-072.7

# TEMPORAL CHANGES IN MYOCARDIAL CONTRACTILITY FOLLOWING BURN SHOCK IN THE RABBIT

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 87 No 5, May 79 pp 402-4-5 manuscript received 14 Jul 78

VASILETS, L. A., VORNOVITSKIY, YE. G. and KHODOROV, B. I., Physiology Laboratory, and Biophysical Research Laboratory, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Studies on frequency-force diagrams of papillary muscles obtained from rabbit myocardium in response to stepwise stimulation with 0.1-0.2-0.5-1-2 Hz current revealed a biphasic response pattern in control muscle: a decrease in the amplitude of contractions in going from 0.1 Hz to 0.2 Hz, and subsequently a proportional increase from 0.2 to 2 Hz. Muscle obtained from rabbits that had sustained a burn shock presented with a monophasic response: a proportional decrease in amplitude from 0.1 to 2 Hz. stimulations 3 h after thermal trauma. The amplitude seen with 2 Hz was 50-70% of that obtained with 0.1 Hz stimulation. Doubling the Ca ion concentration in the perfusing Tyrode's solution restored the biphasic response; restoration was also seen after 3-4 h of perfusion. Poststimulatory potentiation was seen in 100% of the preparations 3 h after burn trauma, but in none of the control muscle preparations. These findings appear to support the hypothesis that toxic substances which block calcium channels by binding to plasma membrane receptors are released as a result of burn shock and thus alter the contractility pattern. Figures 3; references 11: 5 Russian, 6 Western.

## SIGNIFICANCE OF INCREASE PERIPHERAL VASCULAR RESISTANCE IN BURN SHOCK

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII MEDITSINY in Russian Vol 87  
No 5, May 79 pp 400-402 manuscript received 27 Jun 78

SHIK, L. L., and LENKOVA, N. A., Department of Experimental and Clinical Physiology, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] The significance of peripheral vascular resistance in the maintenance of blood pressure and duration of life was investigated on urethane-anesthetized rabbits subjected to scalding water burn over 30% of body surface for 1 min (Group 1), as well as on rabbits in which the burn shock was followed after 20-40 min by sectioning of sino-carotid nerves (Group 2). The findings essentially consisted in a 30% fall in blood pressure of Group 1 animals 10-15 min after scalding, which was maintained until death in ca. 5.5 h. In Group 2 animals, the surgery led to a 14% increase in blood pressure which in 20-40 min resumed the control value and, 10-15 min after scalding, fell by 59% and continued a gradual decline until death of the animals in less than 4 h. Following scalding, Group 1 rabbits showed an immediate and progressive rise in peripheral vascular resistance (PVR) from preshock values of  $17 \times 10^3$  dyne  $\times$  sec  $\times$  cm<sup>-5</sup> to an increase of 246% after 1.5 h and 302% after 3 h. In Group 2 rabbits, PVR was 110% of control value in 10 min, 99% after 30 min, and 98% after 1 h. The data were interpreted to indicate that reflex maintenance of PVR at a high level was responsible for adequate blood pressure in light of diminished cardiac output and, thus, contributed directly to the longer survival time of Group 1 animals. Figures 3; references 17: 7 Russian, 10 Western.

## ESTABLISHMENT OF STABLE CHANGES IN THE MOTOR ACTIVITY OF CHICK EMBRYOS IN CONTROLLED EXPERIMENTS

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII MEDITSINY in Russian Vol 87  
No 5, May 79 pp 387-390, manuscript received 14 Jun 78

MOGDANOV, O. V., STEPANKIN, A. A. and VED', V. V. Laboratory of Neuro-ontogenesis, Department of Ecologic Physiology, Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad

[Abstract] Experiments were conducted on 18-19 day old chick embryos in order to determine whether preselected threshold amplitudes of motor



activity could be maintained following stimulation of the back area with an electric current (right angle current, 300 500 mA, 10 Hz, 1 msec) whenever innate activity fell above or below threshold. The results showed the establishment of motor activity patterns which minimized or avoided the need for electric stimulation. This form of adaptation represented structural and temporal alterations in innate biorhythms and suggests that endogenous biorhythm mechanisms function to optimize organism-environment interaction toward the end stages of chicken embryogenesis. Figures 3; references 4: Russian.

USSR

UDC: 612.227.1

# INTERACTION OF HYPERCAPNIC AND HYPOXIC RESPIRATORY STIMULI DURING PHYSICAL WORK

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 87 No 5, May 79 pp 390-393 manuscript received 19 May 78

ISAYEV, G. G., Respiratory Physiology Group, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] The dynamics of pulmonary ventilation ( $\dot{V}$ ) and composition of alveolar gas ( $P_aCO_2$  and  $P_aO_2$ ) were investigated in 12 healthy young men subjected to graded exertion on exercise bicycles while breathing various gas mixtures (4%  $CO_2$  in air or  $O_2$ ; 13%  $O_2$  in  $N_2$ ; 4%  $CO_2$  + 13%  $O_2$  in  $N_2$ ). Commencement of physical exertion was marked by an upward displacement and increase in slope of the  $\Delta\dot{V}$  vs.  $\Delta P_aCO_2$  plots ( $V-CO_2$  plot) which reflected multiplicative interaction of neurogenic and hypercapnic stimuli. Under steady work conditions and hypoxia,  $V-CO_2$  plots also showed displacement to a higher level in direct relation to the degree of constant exertion. These findings were interpreted to provide proof for the contention that hypercapnic and hypoxic stimuli interact to produce a positive effect which is further potentiated by physical work. Figures 3; references 9: 4 Russian, 5 Western.

USSR

UDC: 632.938:582.288.42

FUNGISTATIC ACTION AND CHEMILUMINESCENCE OF THE GOSSYPOL--PEROXIDASE--  
HYDROGEN PEROXIDE SYSTEM

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol No 2, 1979 pp 115-118  
manuscript received 25 Jan 78

AVER'YANOV, A. A., PANAYOTOV, Ch. A. and RUBIN, B. A., (deceased) Moscow  
State University imeni M. V. Lomonosov

[Abstract] The toxicity of the cotton gossypol peroxidation system for Verticillium dahliae was studied. The pathogenic mycelial strain of V. dahliae was cultured on a Czapek medium to which horseradish peroxidase,  $H_2O_2$  and gossypol were added. Fungistatic activity was evaluated by inhibition of conidial germination. The gossypol concentration of  $10^{-4}$  g/ml did not affect V. dahliae conidial germination. Hydrogen peroxide inhibited germination beginning with  $10^{-3}$  M. Greatest inhibition was observed if the complete system, i. e., gossypol--peroxidase-- $H_2O_2$ , was present. The complete system with  $10^{-3}$   $H_2O_2$  was the most effective in inhibiting germination; the conidia were smaller and many were more translucent than in the controls. Thus, the gossypol peroxidation products have a greater toxicity than the parent compounds. The complete system also exhibited the most intense luminescence. Apparently, the active oxygen forms that participate in the chemiluminescence reaction are formed with the other products that are toxic for the pathogen. The gossypol peroxidation system may be involved in cotton immunity to wilt and may be capable of checking the infection until more toxic phytoalexins are synthesized. Figures 1; references 21: 12 Russian, 9 Western.

USSR

UDC: 632.4:633.872.1:582.282.19(47--13)

BIOLOGICAL CHARACTERISTICS OF THE CASUAL AGENT OF OAK VASCULAR MYCOSIS, A  
FUNGUS FROM THE GENUS OPHIOSTOMA, IN THE SOUTHEASTERN EUROPEAN SECTION OF  
THE RSFSR

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian No 2, 1979 pp 146-152  
manuscript received 15 Jun 76

FIYUKOVA, YE. A. and PLCTNIKOVA, T. S., All-Union Scientific Research  
Institute for Forest and Land Improvement, Volgograd

[Abstract] Oak vascular mycosis is a widespread disease caused by Ophiostoma  
and Ceratocystis species and poses a particular threat in the USSR because  
of its expanding range. O. kubanicum was isolated from oak stands and  
cultivated on oak and elm aqueous extracts in agar. Conidial sporulation

of the Verticillium type is the most typical for O. kubanicum; the Cephalosporium type is rarer. In the spring to summer period, the fungus also forms Graphium type conidial sporulation which indicates its high pathogenicity during this period. The morphology of all three stages is described. The fungus winters in infected oak xylem in mycelial and chlamydospore form. The different developmental stages exhibit specificity for the environment and the host's physiological state. Comparison of the pathogenicity of the Rostov and Volgograd strains by artificial infection of the English oak demonstrated the greater aggressiveness of the Rostov strain; this was evident in the larger infection zone and more intense xylem coloration. The two strains were also morphologically different. O. kubanicum also undergoes mutations which was evident in growth rate and morphological variations in colonies. The period of oak susceptibility from May 10 to Jun 20 in the Volgogradskaya Oblast coincides with the xylem and bascular formation. In addition to the oak, most susceptible to the pathogen were the common elm, fine-leaved elm, English elm and the box elder. Less susceptible were the black locust, Siberian pea shrub, birch, poplar, aspen and ash; the forest pear was resistant. Colonies grown on xylem extracts from the box elder and elm trees were the most similar to the oak colonies; this indicates that there is a correlation between species susceptibility to the pathogen and fungal growth on extracts from the species. Figures 1; references 22: 17 Russian, 5 Western.

USSR

UDC: 528.288.42(470.311)

#### BOTRYTIS CINEREA PERS. POPULATION IN THE MOSCOW OBLAST

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian No 2, 1979 pp 136-139  
manuscript received 28 Sep 78

LIKHACHEV, A. N., Department of Lower Plants, Moscow State University  
imeni M. V. Lomonosov

[Abstract] The population structure of Botrytis cinerea isolated from flooded and dry river bed meadows of the Setun' River, spruce-moss and mixed forests and also from crops in the Moscow Oblast was studied. First symptoms appeared in April on Tussilago farfara, Taraxacum officinale and Corylus avellana; in May on Convallaria majalis, Syringa sp., Alchimilla sp. and Geum rivale; in the second half of June on cultivated strawberries; later on Vicia cracca, Lathyrus pratensis, Vicia faba and Rubus idaeus; and in August on Knautia arvensis, Helianthus annuus and other wild and decorative plants. Reproductive organs and fruit primarily were infected, since these contain the most nutrients and are more susceptible. Study of cultural and morphological indices after 10 days of growth (24°C, wort agar, Czepek

medium and potato agar) revealed that the strains isolated differed little from those previously described. The strains could be divided into sporulating, mycelial and sclerotial. The pathogenicity of the strains was evaluated by artificial infection of beans and broad beans. Strains isolated from V. cracca and V. faba were the most virulent. Attempts at crossing strains isolated from the different hosts were unsuccessful; this may be related to heterogeneous or cytoplasmic incompatibility. The B. cinerea strains isolated are genetically different forms that exhibit preferences for growth conditions. References 19: 14 Russian, 5 Western.

USSR

UDC: 632.4:582.285.2:633.11

#### FACTORS DETERMINING THE PREDOMINANCE IN WHEAT BROWN RUST CAUSAL AGENT POPULATIONS

Leningrad MIKROLOGIYA I FITOPATOLOGIYA in Russian No 2, 1979 pp 131-136  
manuscript received 26 Jun 78

LESOVOY, M. P., Ukrainian Scientific Research Institute of Plant Protection, Kiev

[Abstract] The predominance of a previously rare race among races infecting equally susceptible cultivars is a phenomenon that cannot be explained by the popular "gene-for-gene" theory. An example of this phenomenon in the Soviet Union is the predominance of wheat rust (Puccinia triticina) race 77 among four equally virulent races. A factor that determines race predominance in addition to the gene-for-gene mechanism, may be the competitiveness of races which characterizes their aggressiveness; this in turn is affected by factors including temperature. The effect of temperature of competitiveness was studied in two wheat rust races. Since the study of fungal aggressiveness is related to many procedural difficulties, a method was developed based on obtaining sequential fungal generations from artificial mixtures of races at known initial concentrations. Races 77 and 52 were used since they could be distinguished by the different reactions on differentiator cultivars. Race 77 was highly competitive at 16 and 20°C; it predominated after five uredospore generations even if a minimum amount was used initially. Its competitive edge decreased at 25°C. At 28°C, which is apparently beyond the strain's optimal limits, after five generations it differed from the initial concentration only by 1.3%. Race 77 spores were also more viable than race 52 spores at 16 and 20°C, but the spore viability began to decrease at 25°C. If at 25°C on Day 8 after plant infection the number of race 77 spores exceeded the race 52 spores by 4%, then by Day 10 and 12 their numbers decreased by 10 and 14%, respectively. Inoculation capacity of race 77 is greater than that of race 52 at 16, 20 and 24°C. Because of its wide virulence and high aggressiveness race 77 dominates on cultivars with monogenic and polygenic resistance.



Thus, the direction and rate of evolution of aggressive properties in the pathogen is determined not only by gene-for-gene interaction but also by race competitiveness. The brown rust casual agent produces up to 10 uredospore generations within one wheat vegetation period which indicates a high evolutionary rate for these properties. This produces a population with new aggressive properties that increase the infection rate of wheat cultivars. Figures 3; references 5: 1 Russian, 4 Western.

USSR

UDC: 632.4:633.14:582.285.2

RELATIONSHIP BETWEEN RYE POPULATIONS AND THE STEM RUST CAUSAL AGENT  
*PUCCINIA GRAMINIS* PERS. F. SP. *SECALIS* ERIKS. ET HENN.

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian No 2, 1979 pp 129-131  
manuscript received 6 May 77

KOROLEVA, L. A.

[Abstract] The virulence of eight *Puccinia graminis* f. sp. *secalis* isolates from the Moscow (1-5), Grodnenskaya (6) and Ternopolskaya (7) oblasts and from the Tatarskaya ASSR (8) for *Secale cereale* cv. Krupnozernaya and the wild rye *S. kuprijanouii* Grossh was studied without the use of hybridological analysis. Infected leaves were placed in benzimidazole-containing agar; specific resistance was evaluated using the Stackman-Levin scale. The rye populations differed quantitatively in fungus resistance gene concentration. Immunological evaluation demonstrated that the cultivar Krupnozernaya had a higher resistance gene concentration than the wild rye: 31 plants were resistant to most pathogen isolates in comparison with only 5 wild rye plants. Isolates 2 and 3 were the most virulent with a 70-80% rye infection rate; 6 was the least virulent; and 1 and 8 were also rather weakly virulent. The study of host-parasite interaction based on gene complementarity is the first stage in studying the genetics of rye resistance to this pathogen. References 7: 3 Russian, 4 Western.

PREDICTION OF INCREASE IN CHILD POPULATION WITH NEW HOUSING CONSTRUCTION  
(AS EXEMPLIFIED BY THE BAYKAL-AMUR RAILROAD PROJECT)

Moscow GIGIYENA I SANITARIYA in Russian No 1, 1979 pp 53-55 manuscript  
received 30 Jun 77

ABRAMOV, A. I. and KUDRYAVTSEVA, YE. V., Institute of the Hygiene of  
Children and Adolescents, USSR Ministry of Health, Moscow

[Abstract] The increase in child population on the area of the construction of the Baykal-Amur Railroad (BAM) was investigated ever since the first, temporary housing settlements there began to be built at the end of 1974. Analysis of the mean quarterly increment in the number of builders, their family members, all children, and children in different age groups, during the year 1975 and 1976 shows that the increase in the child population proceeded parallel to the establishment of new housing settlements with improved amenities for builders and the expansion of construction operations, particularly in the summer season. Within 2 years, the child population increased from 2825 early in 1975 to 18,298 in the last quarter of 1976, chiefly owing to the influx of young construction workers which resulted in the formation of many new families. This sudden unanticipated increase in child population has placed a heavy burden on schools and preschools, which by the end of 1976 could accommodate only 50% of the demand for vacancies. Measures to expand the construction of schools and preschools are needed. This two-year study of the increase in child population in newly built housing settlements for BAM builders shows that, despite the rigorous climatogeographic and extremal conditions of BAM construction the child population is steadily increasing. The pace at which medical care for the child population is being provided also is lagging behind the demand. On the basis of this study plans should be made for providing in every new housing settlement for 50 preschool vacancies toward the end of the first year of construction and an additional 75 vacancies toward the end of the second year; the corresponding figures for school vacancies should be 320 toward the end of the first year and 520 toward the end of the second, with mandatory construction of a gymnasium in schools with upward of 320 vacancies.

## HYGIENIC ASSESSMENT OF THE BARRIER ROLE OF WATER TREATMENT FACILITIES WITH RESPECT TO SURFACE ACTIVE SUBSTANCES AND THE PRODUCTS OF THEIR TRANSFORMATION

Moscow GIGIYENA I SANITARIYA in Russian, No 1, 1979 pp 15-20 manuscript submitted 12 Jul 78

SHTANNIKOV, YE. V. and Il'IN, I. YE., Saratov Medical Institute

[Abstract] The barrier role of water treatment facilities with respect to surface active substances (SAS) of various kinds and the products of their transformation was assessed. To this end, the effectiveness of primary chlorination, coagulation, settling, filtration, secondary chlorination, and ozone treatment was investigated. The pollution of water by SAS was simulated by means of the most widely used detergents with various physico-chemical properties, in concentrations exceeding 2, 3, and 5 times the maximum permissible concentration, in accord with their actual content in water bodies. Special attention was paid to "hard" SAS with a lengthy period of natural hydrolytic decomposition--the anion-active azolate A and sulfonol NP-1, as well as the non-ionogenic OP-7 and OP-10. Secondary alkyl sulfate was used in the capacity of "soft" SAS. It was established that the customary water treatment techniques are relatively ineffective with respect to SAS: purification reached only 50-60%. Coagulation and chlorination are particularly ineffective. However, treatment with various filtering materials, especially activated charcoal increased the effectiveness of purification to 95%. Treatment with ozone also is effective. The products of SAS transformation forming in the process of chlorination differ in their toxic-dynamic properties from those of the original substances and may affect the functions of the organism (reduction in cholesterol level and in  $\beta$ -lipoproteins in the blood serum) as well as hemoglobin and erythrocyte levels. In hygienic monitoring of the quality of the treated water, special attention should be paid to the filtering effectiveness of various sorption materials with respect to SAS. Figures 2; references 4: Russian.

## HYGIENIC ASPECTS OF STUDY AND PREDICTION OF THE WATER RESOURCES OF SIBERIA AND THE FAR EAST

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SHITSKOVA, A. P. , Moscow

[Abstract] The sanitary state and conservation of water resources in Siberia

and the Far East are surveyed in connection with the continuing colonization of these regions. In some areas this state leaves much to be desired, particularly in Tyumen', South Yakutiya, Blagoveshchensk, Khabarovsk, Komsomol'sk-on-the-Amur, and Tomsk. In the areas with polluted water sources there exists the danger of acute gastrointestinal diseases. Pollution by industrial liquid wastes also is a factor. It has been found that the rate at which the cold waters of the northern rivers purify themselves of fecal intestinal bacillus, enterococci, and salmonellae is 30-20% lower than the waters of the more temperate regions of the USSR. An allowance should be made for this fact when designing sanitation measures. The situation has at times necessitated abandoning the construction of new industrial enterprises, as, e. g., in Kemerovo. In addition to anthropogenic pollution, such natural factors as the shortage of dissolved oxygen in the waters owing to their low temperatures also has to be considered. The impossibility of a broad use of subterranean waters in these regions also is a characteristic factor, owing to their distinct alkali reaction, high boron content, and a high level of a petroleum products of natural origin, or, conversely, owing to their low mineralization, along with the presence of a broad range of trace elements. Since Siberia and the Far East account for 85% of the country's water resources and the questions of diverting these resources to the European part of the USSR is becoming important, the assessment of the quality and sanitary situation of these resources is also becoming important.

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